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M E M O R A N D U M

TO: John Mitnik, Chief, Engineering and Construction Bureau
Paul Linton, Administrator, Water Control Operations Section

FROM: SFWMD Staff Environmental Advisory Team

DATE: October 4, 2016

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Hurricane Matthew is expected to bring wind and rain to the District Thursday. An upper level trough remains in the central Gulf of Mexico and it is expected to help develop scattered thunderstorm activity over the District today and steering winds will shift activity west and north as it develops. Hurricane Matthew is forecast to move through the central and northwest Bahamas Wednesday and Thursday and then move along the east coast of central and north Florida Thursday night and Friday. Tropical storm and possibly hurricane conditions are expected to spread over eastern and northern areas Thursday and Thursday night with areas of heavy rain getting two to six inches. Scattered shower activity is expected mainly north and east Friday. After the storm, drier air is forecast to move over the area and stop the daily seabreeze cycle for the weekend and next week. This may also be the end of the rainy season.

Kissimmee

On Sunday, stages in East Lake Toho, Lake Toho, and Kissimmee-Cypress-Hatchineha were above schedule by 0.3, 0.2 and 0.6 feet, respectively. Over the past week, discharge at S65, S65A, and S65E averaged 1,968, 2,557, and 4,960 cfs, respectively. Tuesday morning discharges were ~1,520 cfs, ~2,032 cfs, ~3,238 cfs, and ~3,844 cfs, respectively at S65, S65A, S65C, and S65E. Dissolved oxygen in the Kissimmee River averaged 1.78 mg/L over the past week. Kissimmee River mean floodplain depth on Sunday was 1.78 feet. There are no new recommendations this week.

Lake Okeechobee

Lake Okeechobee is at 15.78 feet NGVD having increased by 0.09 feet over the past week. The Lake remains in the Low Flow sub-band but is now 0.28 feet above the top of the preferred stage envelope (15.5 feet NGVD) and 0.17 feet from the bottom of the Intermediate sub-band. If Hurricane Matthew passes over or near the Lake, the potential exists for Lake levels to continue to rise into a range where additional ecological damage may occur.

Estuaries

Total discharge to the St. Lucie estuary averaged 3,576 cfs over the past week with 2,193 cfs (61%) coming from Lake Okeechobee. Salinity at the US1 Bridge is in the poor range for oysters. Based on a Surveying Estuarine Response to Freshwater Inflows (SERFIS) survey on September 30, chlorophyll a concentrations are below 20 µg/L throughout the estuary, but turbidity is elevated in the South Fork. Total inflow to the Caloosahatchee estuary averaged 8,563 cfs over the past week with 5,643 cfs (66%) coming from the Lake. Salinity conditions are good for tape grass in the upper estuary and are good for oysters at the Sanibel Causeway, in the fair range at Shellpoint, and in the poor range at the Cape Coral Bridge. Given the current estuarine conditions, there are no ecological benefits associated with additional releases from Lake Okeechobee.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs received approximately 1,300 acre-feet of Lake regulatory releases. The total amount of Lake regulatory releases sent to the STAs/FEBs in WY2017 (since May 1, 2016) is approximately 71,500 acre-feet. All STA cells are at or above target depths. Operational restrictions are in place for structure repairs in STA-1E. This week, because of a forecast for heavy rainfall associated with Hurricane Matthew, it is recommended that no Lake Releases be sent to the STAs/FEBs.

Everglades

Stage changes in the WCAs and northeastern Everglades National Park (ENP) ranged from -0.05 feet to +0.13 feet. The Fish and Wildlife Commission (FWC) closures within the WCAs are still in effect due to high water levels and the expectation of continued high water. The 30-day moving average salinity at the Florida Bay MFL site is 0.3 psu and the cumulative 365-day inflow from the five creeks into Florida Bay decreased to 351,266 acre-feet. There are no new recommendations.

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 1.68 inches of rainfall in the past week and the Lower Basin received 1.84 inches (SFWMD Daily Rainfall Report 10/03/2016).

Upper Kissimmee Basin

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in Table1.

Table 1. Departures from KCOL flood regulation (F) or temporary schedules (T, A, or S) (feet NGVD). Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: 10/4/2016							Sunday Departure (feet)						
Water Body	Structure/Site	Discharge (cfs), week's average**	Stage Monitoring Site***	Lake Stage (feet)	Schedule*	Regulation (R) or Target (S or T) Stage (feet)	10/2/16	9/25/16	9/18/16	9/11/16	9/4/16	8/28/16	8/21/16
Lakes Hart and Mary Jane	S62	243	LKMJ	60.1	R	60.0	0.1	0.0	0.2	0.1	-0.1	0.0	0.1
Lakes Myrtle, Preston, and Joel	S57	112	S57	60.9	R	61.0	-0.1	0.0	0.1	0.0	-0.1	0.1	0.0
Alligator Chain	S60	136	ALLI	63.3	R	63.2	0.1	0.1	0.1	0.0	-0.1	0.0	0.0
Lake Gentry	S63	238	LKGT	61.1	R	61.0	0.1	0.0	0.1	0.0	-0.1	0.0	0.0
East Lake Toho	S59	537	TOHOE	57.3	R	57.0	0.3	0.2	0.2	0.1	-0.1	-0.3	0.3
Lake Toho	S61	1123	TOHOW, S61	54.2	R	54.0	0.2	0.2	0.2	0.1	0.0	0.0	0.0
Lakes Kissimmee, Cypress, and Hatchineha	S65	1968	LKISSP, KUB011, LKIS5B	52.1	R	51.5	0.6	0.6	0.9	1.4	1.2	0.5	0.4

* T = temporary schedule, R = USACE flood control schedule, S = temporary snail kite schedule, A = projected ascension line, N/A= not applicable or data not available.

** Seven-day average of weighted daily means through Sunday midnight.

*** Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.

DATA ARE PROVISIONAL

Lower Kissimmee Basin

Discharges and stages at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 12. Kissimmee River floodplain stages at selected stations are shown in Figure 13.

Table 2. Mean weekly discharge at S-65x structures, and mean weekly Phase I area river channel dissolved oxygen and floodplain mean water depth. Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: 10/4/2016

Metric	Location	Sunday's 1-day average	Weekly Average**									
			10/2/16	9/25/16	9/18/16	9/11/16	9/4/16	8/28/16	8/21/16	8/14/16	8/7/16	7/31/16
Discharge (cfs)	S-65	1501	1968	4001	3991	3290	1080	841	624	532	579	643
Discharge (cfs)	S-65A	1898	2557	4966	4861	5101	2538	808	666	661	694	638
Discharge (cfs)	S-65C	3590	4459	5247	5054	3760	2124	928	1024	1081	1000	1219
Headwater stage (feet NGVD)		33.7	33.6	33.8	33.7	33.8	34.1	34.1	34.0	34.1	34.3	34.1
Discharge (cfs)	S-65D****	4630	5532	6302	5224	3971	2172	1181	1140	1142	1037	1284
Discharge (cfs)	S-65E	4097	4960	5802	5246	4077	2900	910	1061	1137	986	1158
DO concentration (mg/L)***	Phase I river channel	2.09	1.78	1.55	1.20	1.35	3.88	4.75	4.04	4.09	4.58	4.76
Mean depth (feet)*	Phase I floodplain	1.78	2.11	2.49	2.28	1.71	0.65	0.28	0.37	0.41	0.37	0.42

* 1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

** Seven-day average of weighted daily means through Sunday midnight.

*** DO is the average for PC62 and PC33 starting June 2. PC33 omitted for week of Aug16. DO for week of Sept 15-22 is for PC33 only.

**** S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2.

DATA ARE PROVISIONAL.

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
10/3/2016	No new recommendations.			
9/27/2016	<ul style="list-style-type: none"> Begin reducing discharge when Ops and management feel the time is right (could be now) Use the discharge table below to ramp down to 1400 cfs; however, if stage should stop declining or start to rise during the rampdown, hold the current discharge unless stage begins to decline again If KCH stage reaches ~50.5 ft, hold ~1400 cfs while KCH stage is at or above ~50.5 ft, then: <ul style="list-style-type: none"> If KCH stage declines below ~50.5 ft, continue reducing discharge, potentially to minimum discharge. However, if stage stops declining or starts to rise during the rampdown, hold or increase current discharge until stage begins to decline again or until it rises to ~50.5 ft If KCH stage rises or stays above ~50.5 ft, hold ~1400 cfs unless stage approaches ~0.25 ft below the regulation line. If stage continues to rise into this buffer zone, use the discharge table to ramp up in anticipation of flood control releases 	To the extent possible, avoid repeated wet/dry cycles in the Kissimmee River floodplain and extend the period of continuous floodplain inundation without decreasing lake stage too much. The recommendation is similar to the discharge plan used last wet season that balanced the river, the KCOL, and downstream waterbodies.	TBD	KB Operations
9/20/2016	No new recommendations.			
9/13/2016	No new recommendations.			
9/6/2016	No new recommendations.			
8/30/2016	Use figure 8a as possible for discharge rampup/rampdown at S65/S65A.			
8/23/2016	No new recommendations.			
8/16/2016	No new recommendations.			
8/9/2016	No new recommendations.			
8/2/2016	No new recommendations.			
7/26/2016	No new recommendations.			
7/19/2016	No new recommendations.			
7/12/2016	No new recommendations.			
6/30/2016	Ramp down S65/S65A discharge by 150 cfs per day to 650 cfs and hold at 650 cfs until lake stage rises to Zone A of the schedule. When stage enters Zone A, ramp up S65 discharge to 1,400 cfs as stage rises from 0.0 to 0.6 feet above the regulation line unless there is a large rainfall event. This ramp up schedule will be reevaluated when the regulation schedule reaches 52.0 feet NGVD.	The ramp down in S65/S65A discharge is intended to lessen the impact of Lake Okeechobee releases on naturally occurring algal blooms. Holding discharge at 650 cfs reflects consideration for the Snail Kites nesting in the Kissimmee River floodplain.	Implemented	SFWMD Operations Control
6/28/2016	No new recommendations.			
6/21/2016	No new recommendations.			
6/14/2016	No new recommendations.			
6/7/2016	No new recommendations.			
5/31/2016	No new recommendations.			
5/24/2016	No new recommendations.			
5/17/2016	No new recommendations.			
5/10/2016	No new recommendations.			
5/3/2016	No new recommendations.			
4/26/2016	No new recommendations.			
4/19/2016	No new recommendations.			
4/12/2016	No new recommendations.			
4/5/2016	No new recommendations.			
3/29/2016	No new recommendations.			
3/22/2016	No new recommendations.			
3/15/2016	No new recommendations.			
3/8/2016	No new recommendations.			
3/1/2016	No new recommendations.			
2/23/2016	No new recommendations.			
2/16/2016	No new recommendations.			
2/9/2016	No new recommendations.			

KCOL Hydrographs (through Sunday midnight)

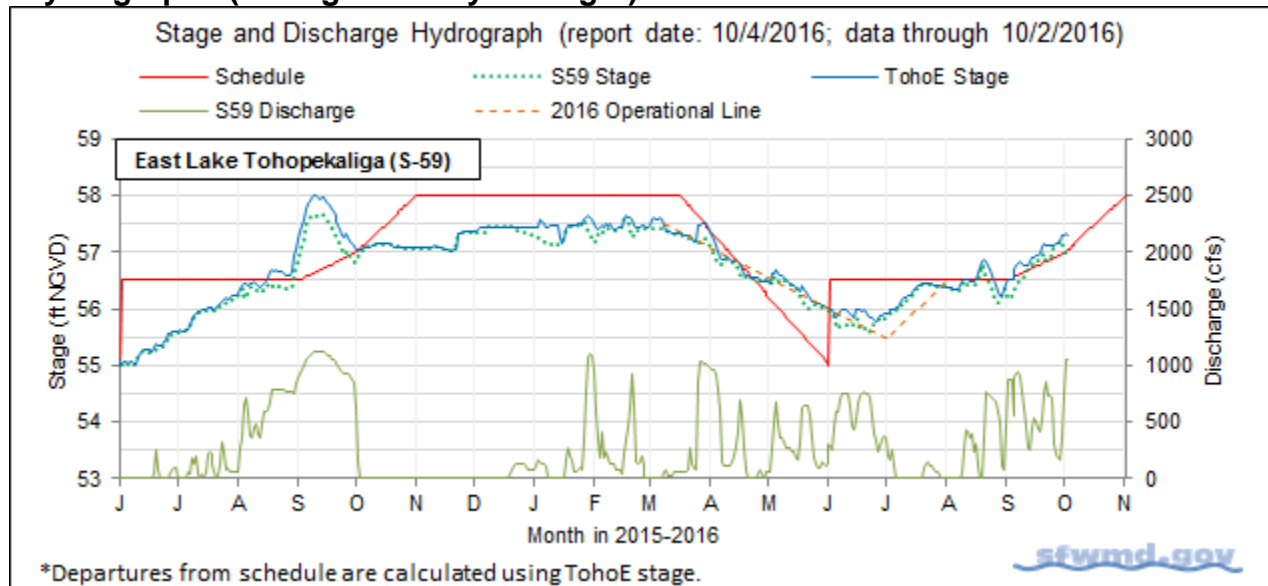


Figure 1.

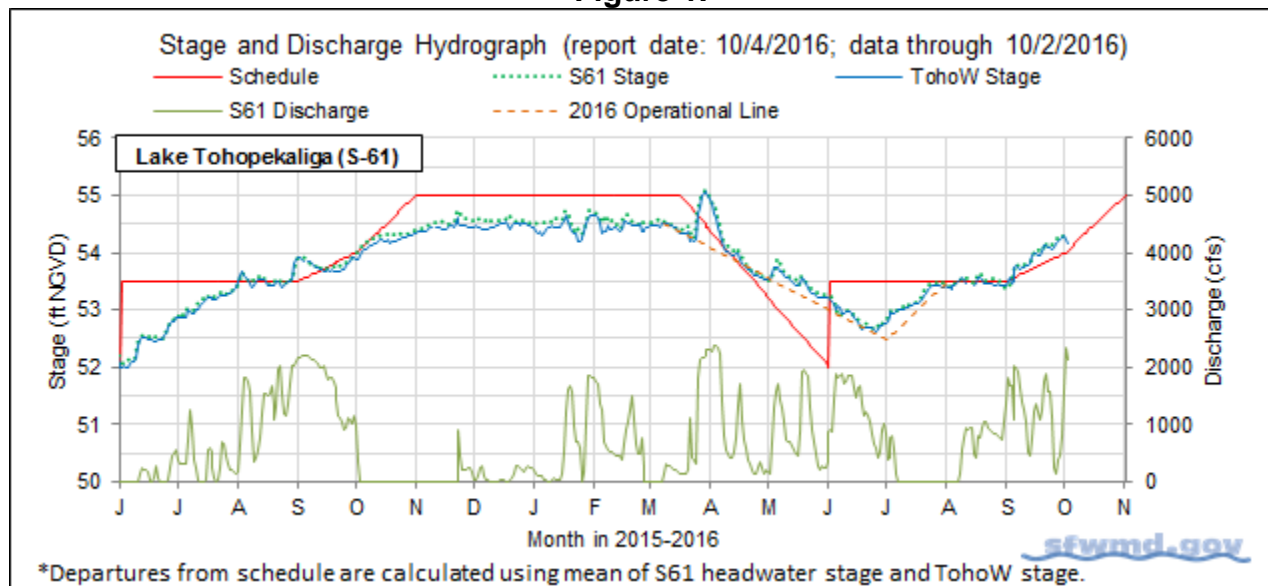


Figure 2.

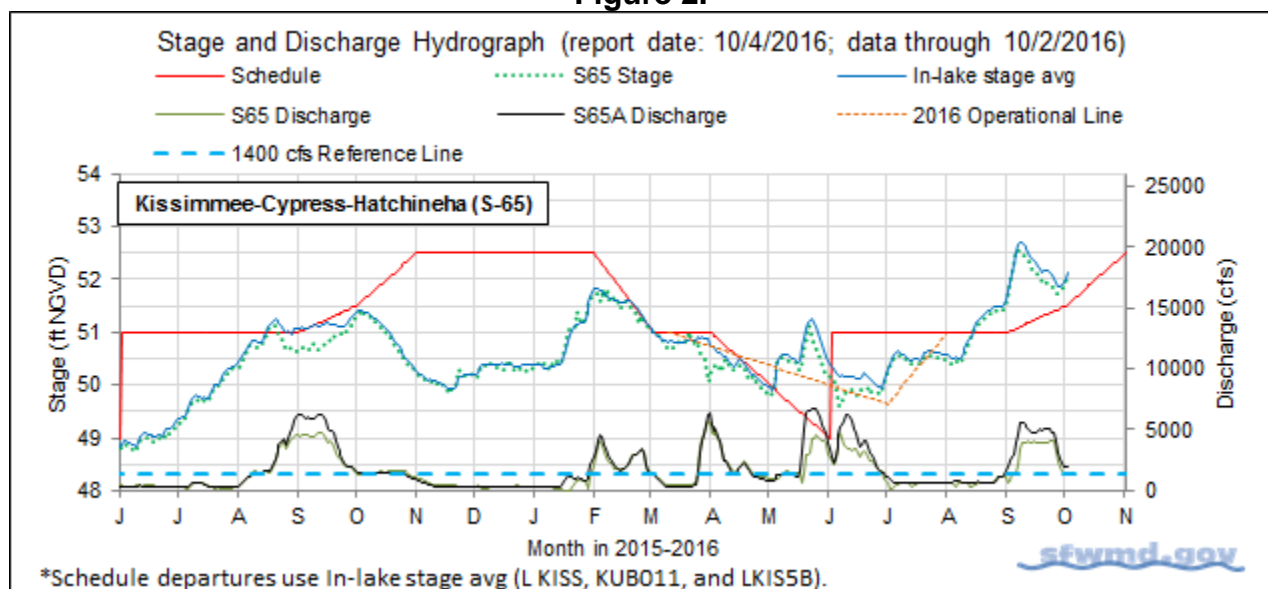


Figure 3.

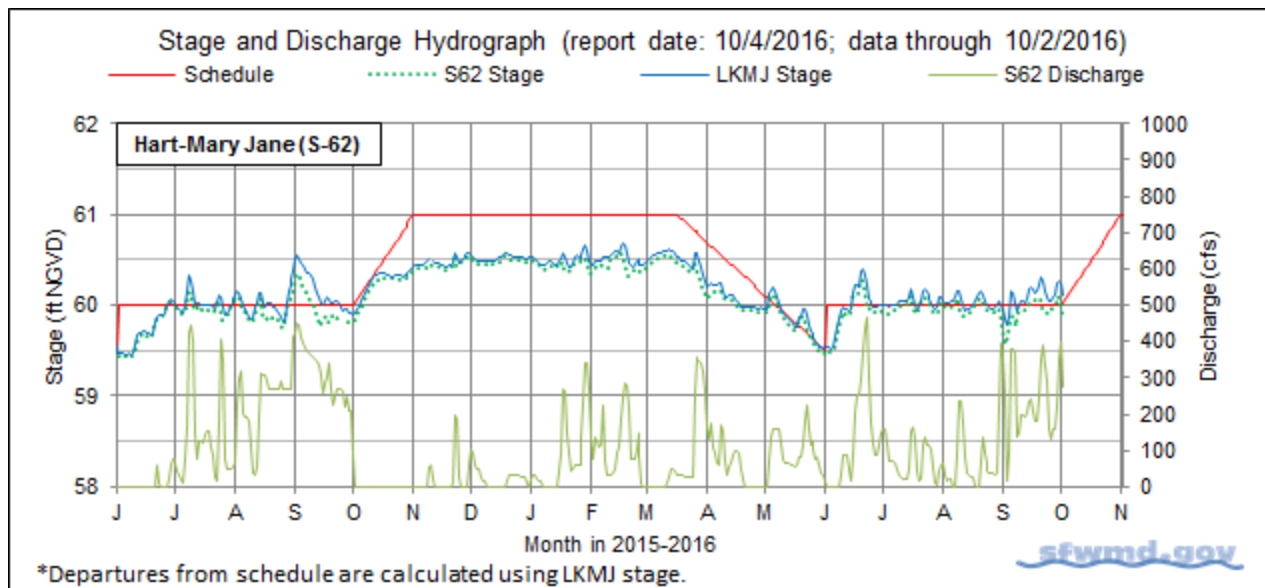


Figure 4.

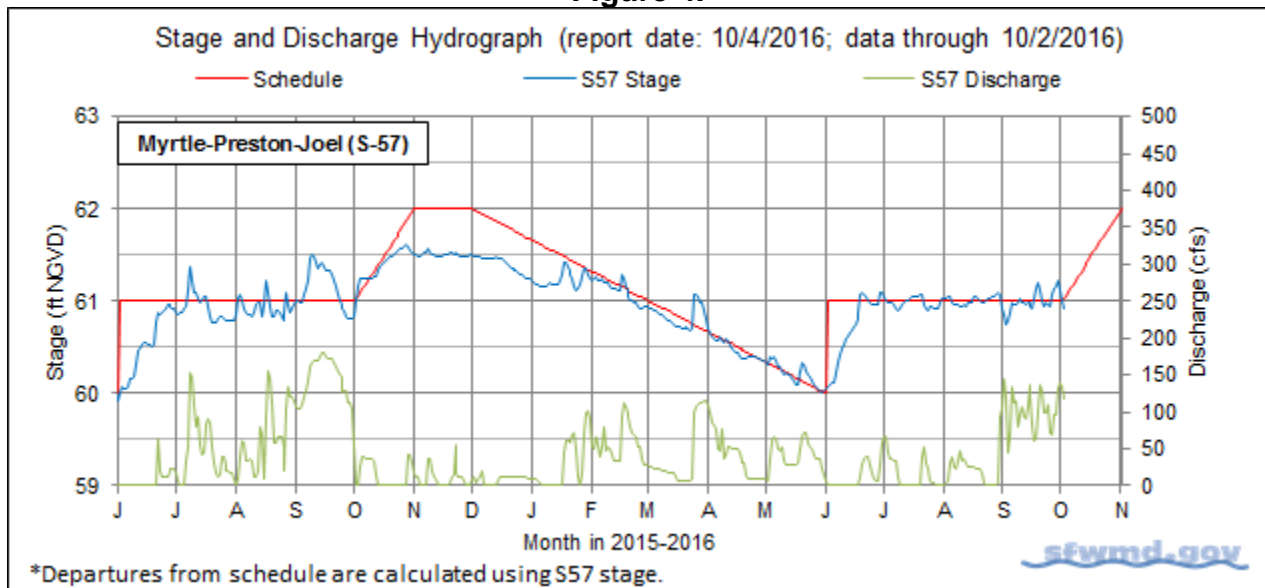


Figure 5.

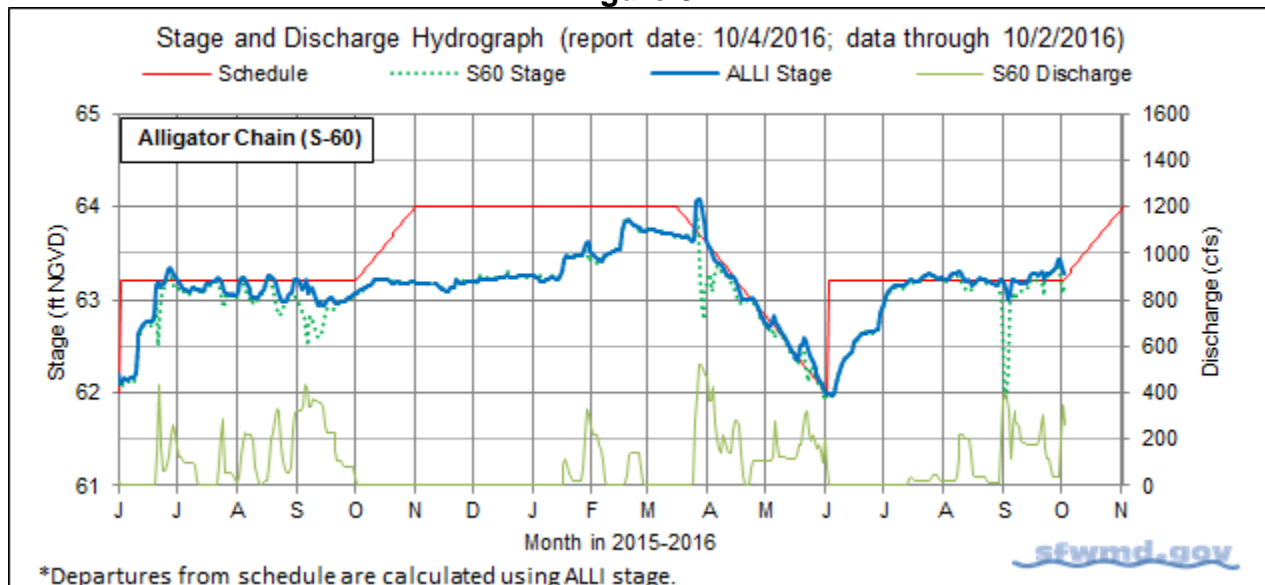


Figure 6.

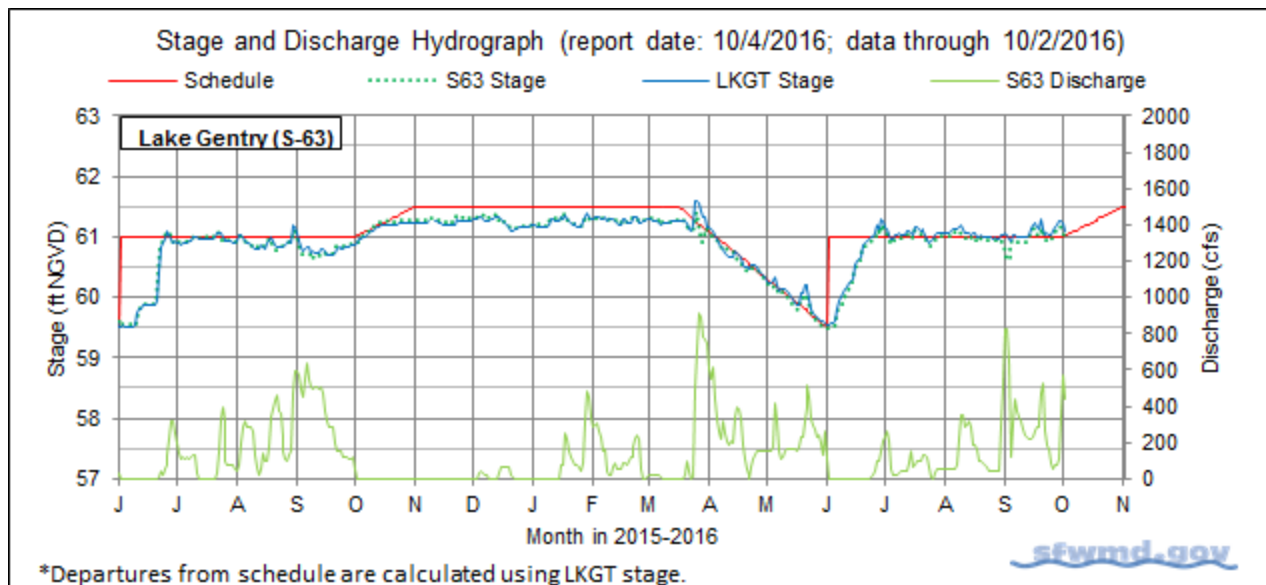


Figure 7.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Limits on Rate of Discharge Change at S65/S65A During Wet Season 2016

Q (cfs)	Maximum rate of increase (cfs/day)	Maximum rate of decrease (cfs/day)
650-1450	150	-150
1450-1700	250	-250
1700-2600	300	-300
2600-3000	400	-400
>3000	1000	-1000

13

Figure 8a. Limits on rate of discharge change at S65/S65A for the 2016 Wet Season.

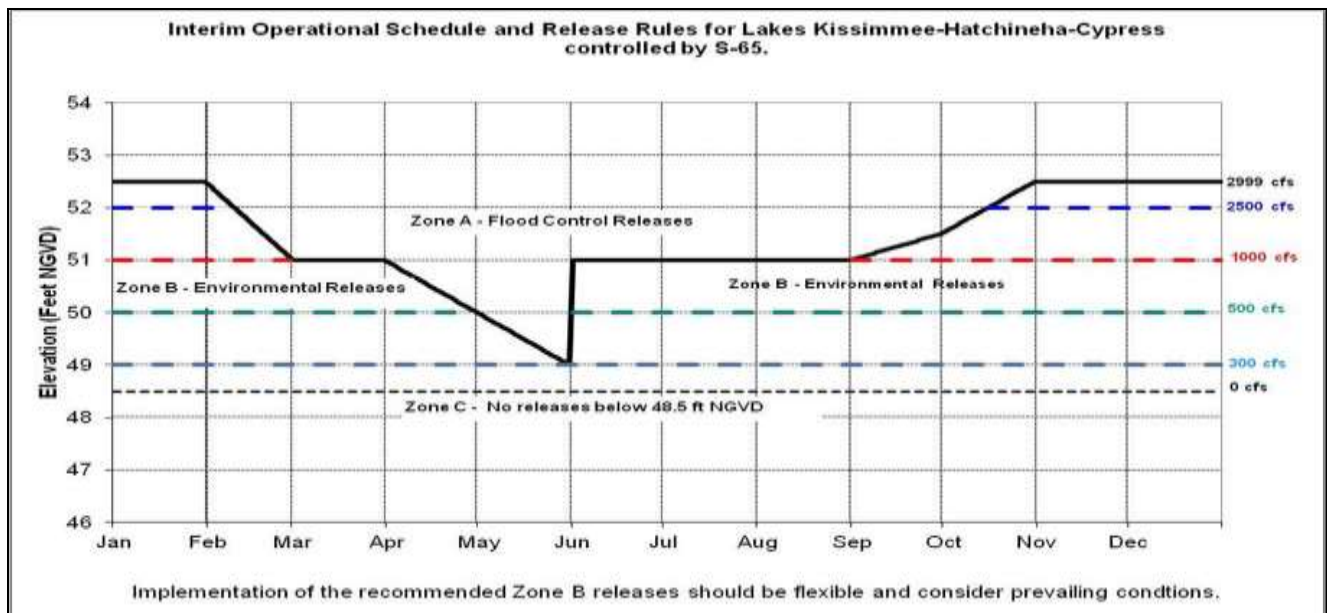


Figure 8b. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

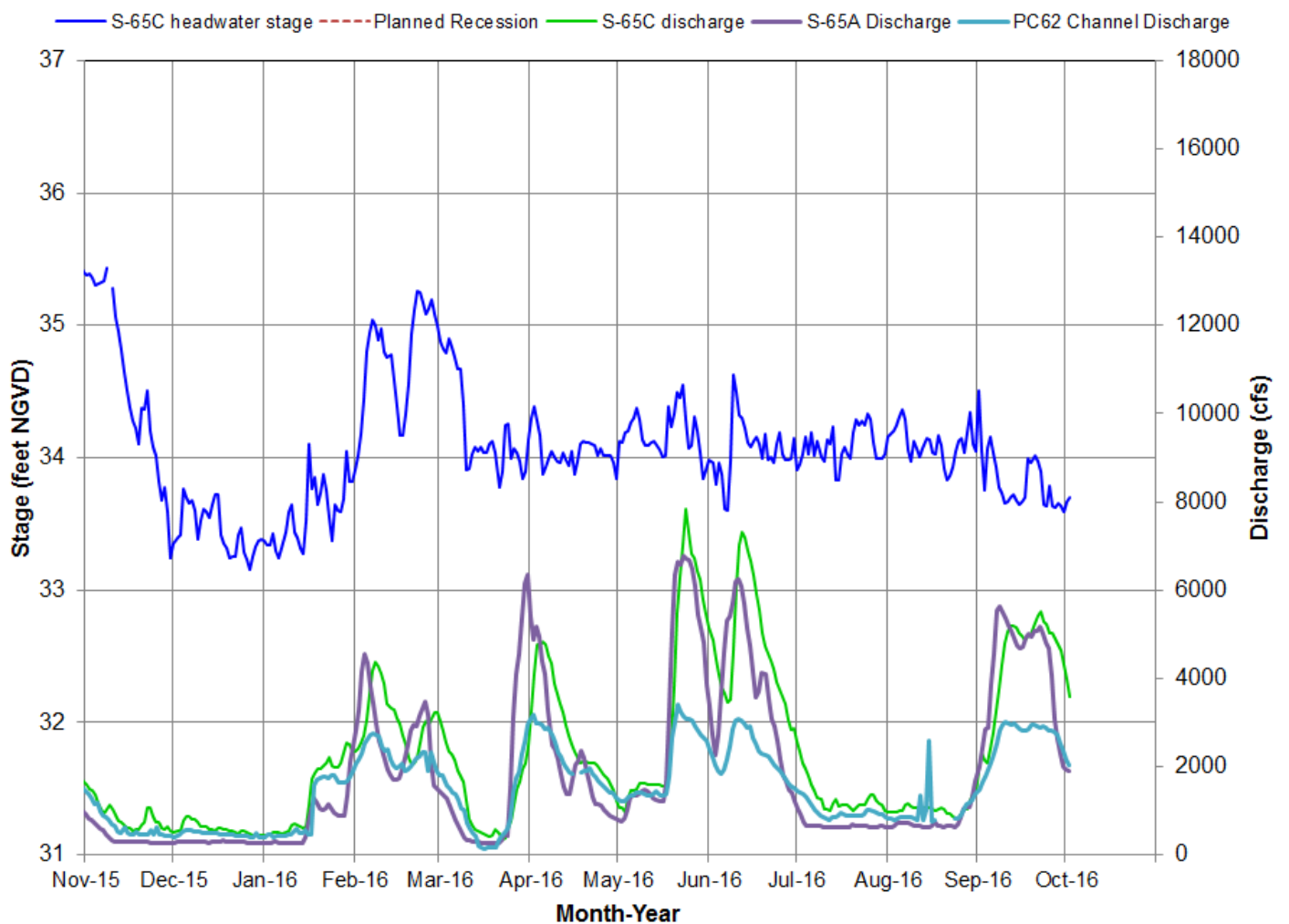


Figure 9. S-65C headwater stage in relation to discharge at S-65C, S-65A, and PC62.

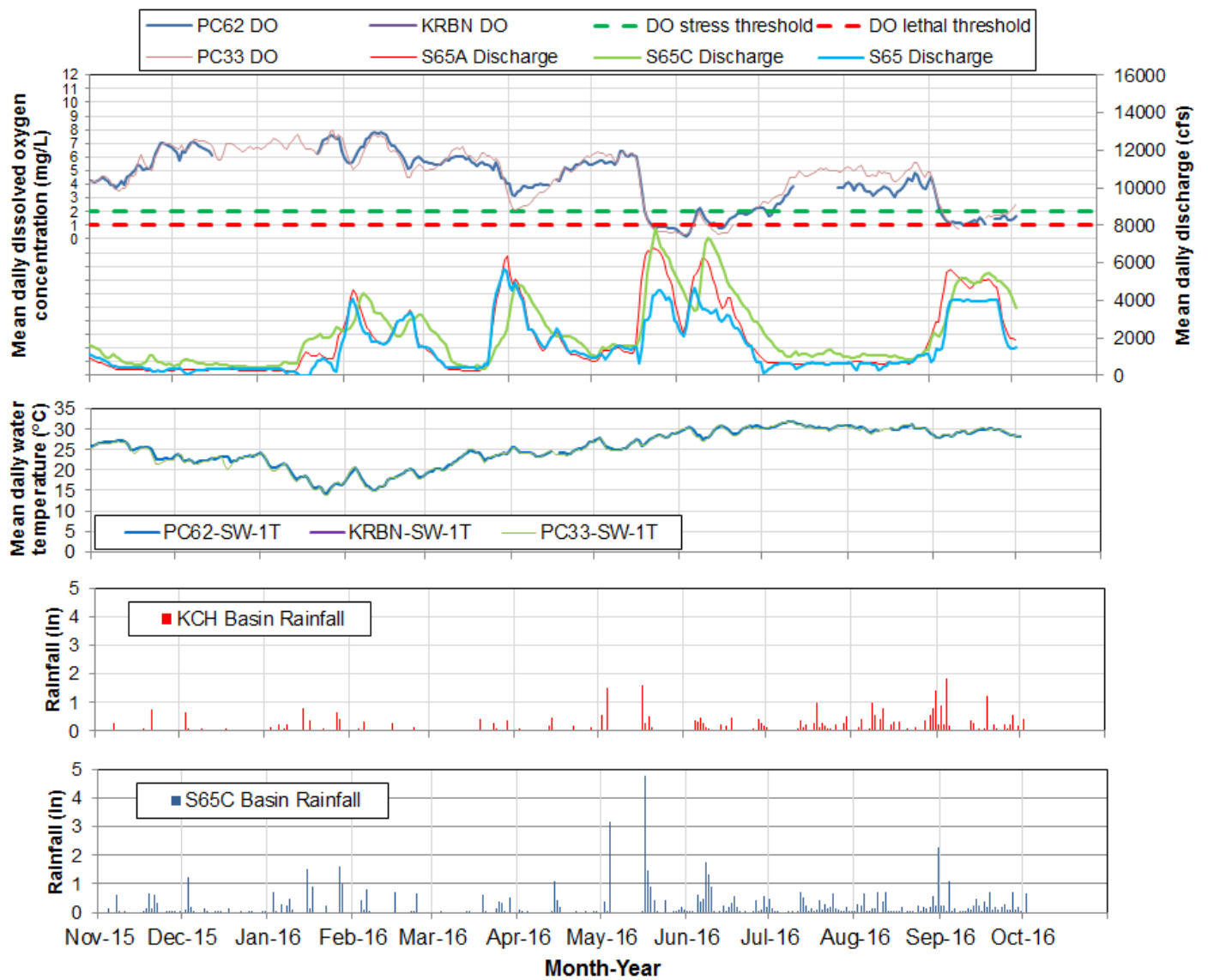


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

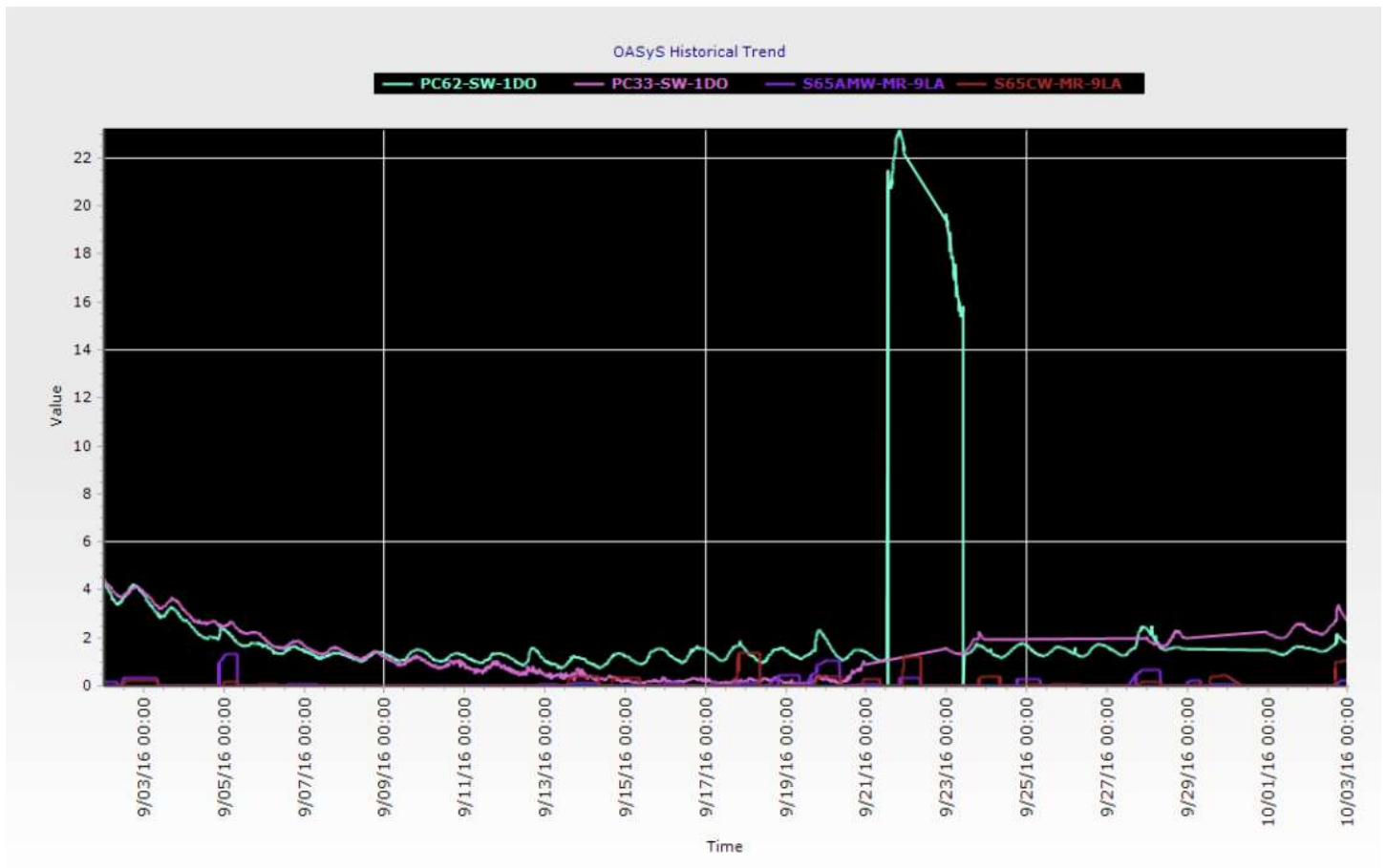


Figure 11. Phase I river channel dissolved oxygen (measured at 15 minute intervals) and rainfall at S65A and S65C.

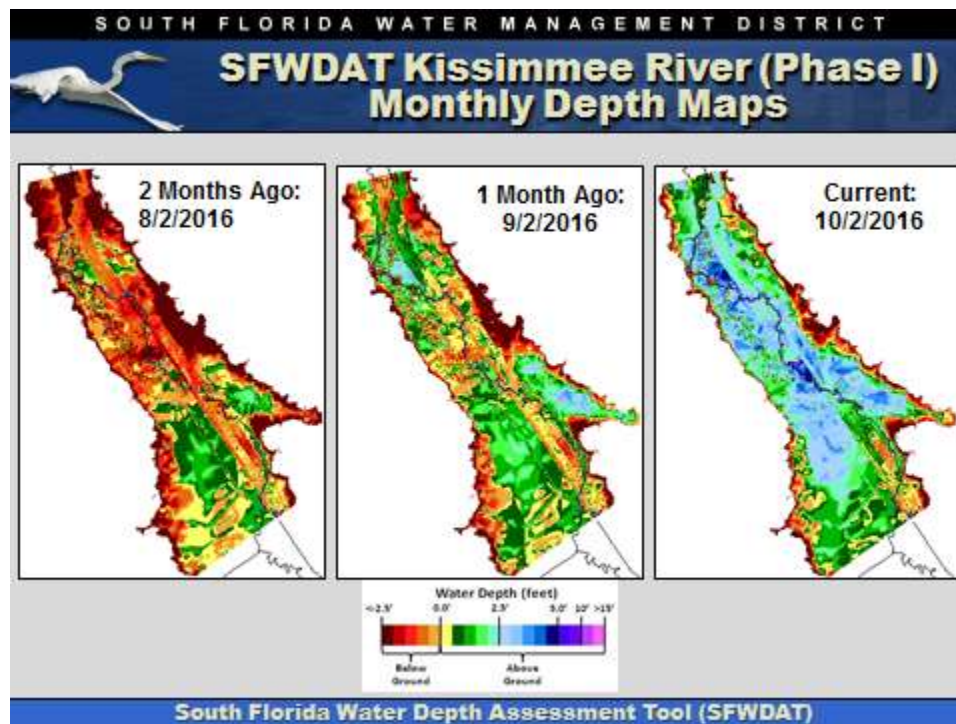
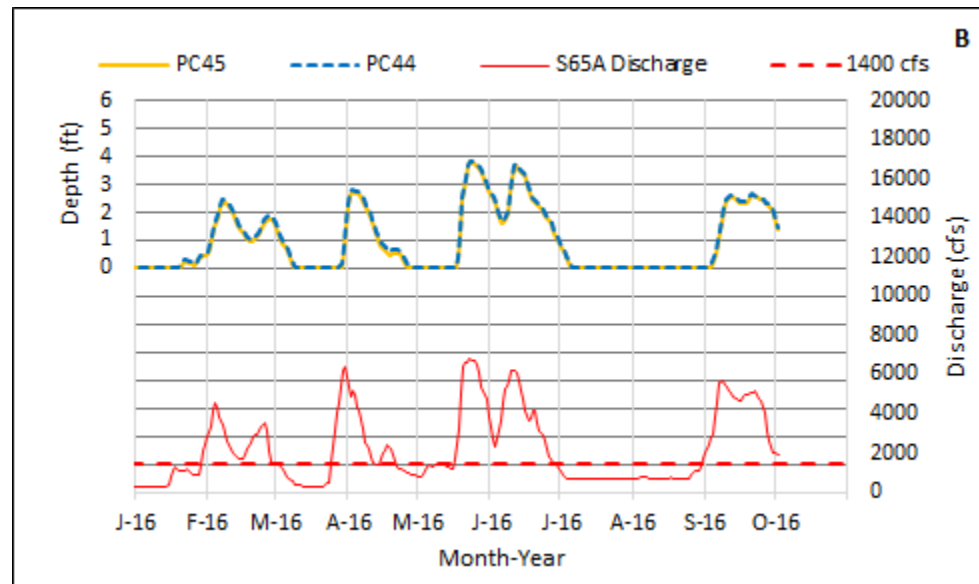
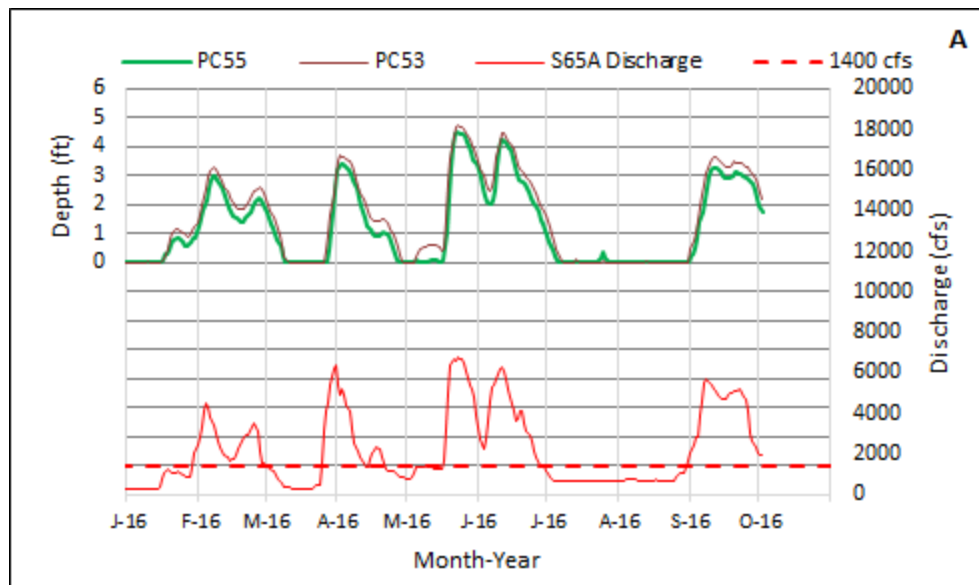


Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.



Insert. Water depth at selected northern Kissimmee River floodplain sites on (A) the PC5's transect and (B) the PC4's transect, with S65A discharge.

Kissimmee River Hydrographs

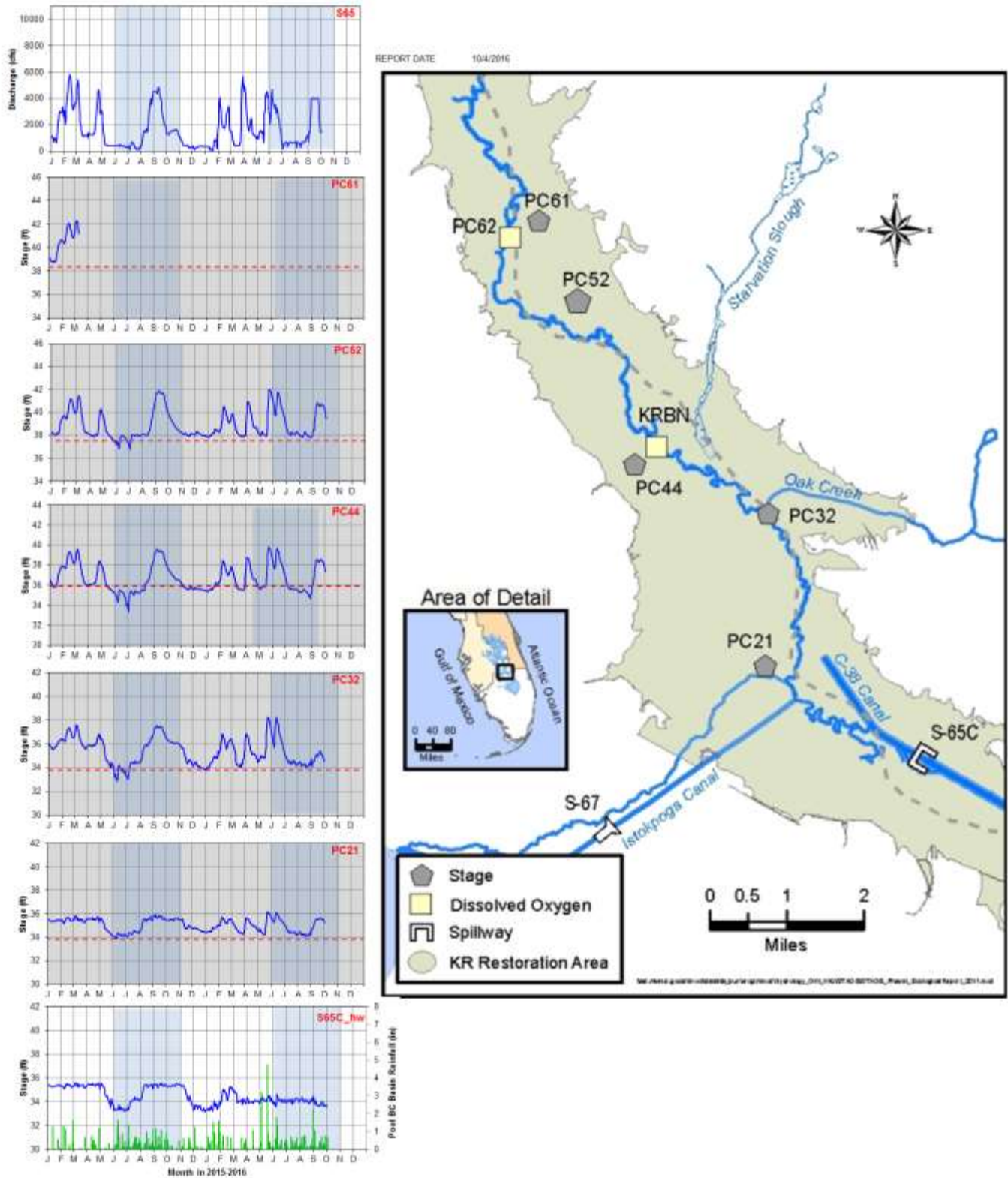
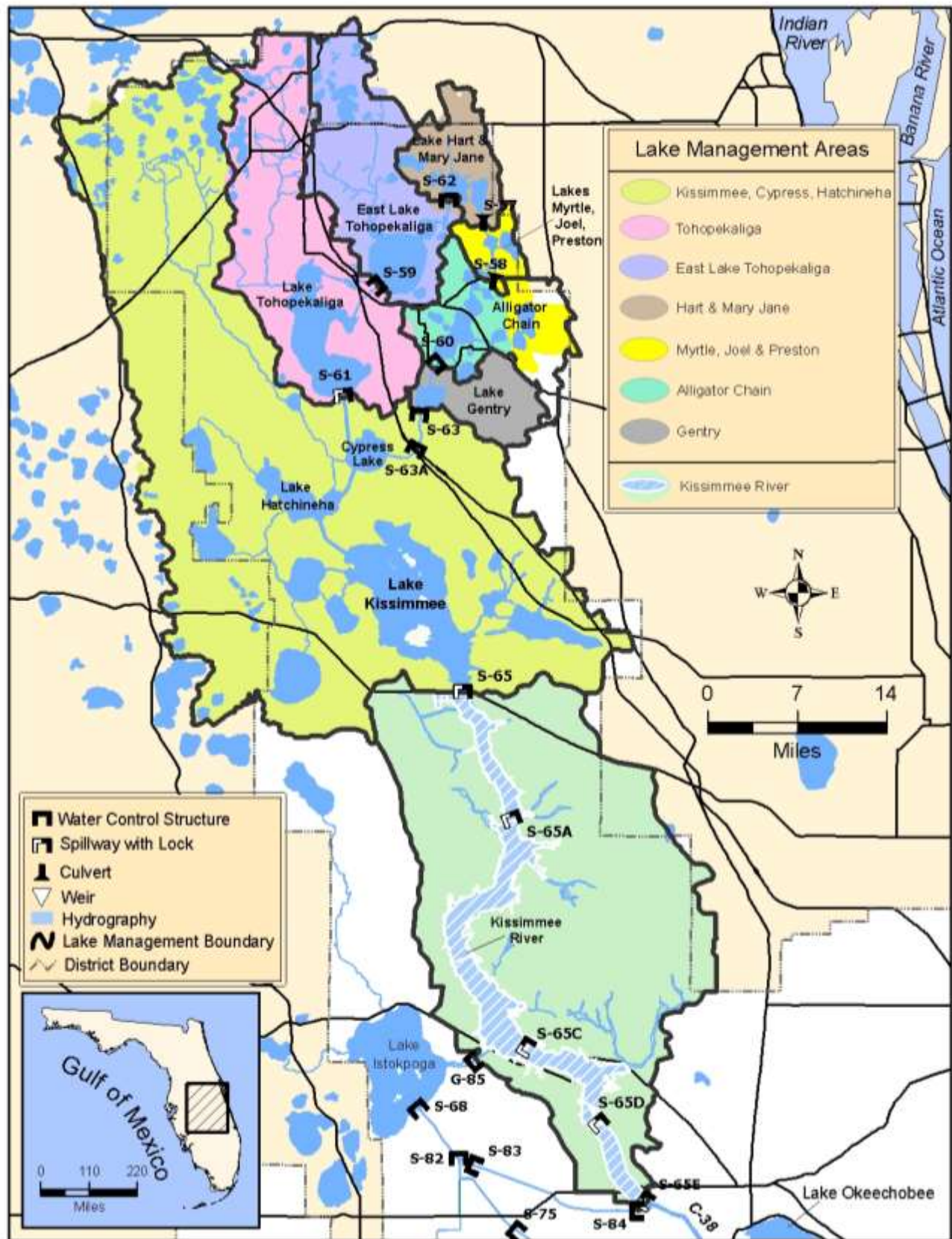


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated). Dashed lines are ground elevations.



LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 15.78 feet NGVD for the period ending at midnight on October 3, 2016. This value is based on the use of four interior Lake stations (L001, L005, L006, and LZ40) and four perimeter stations (S352, S4, S308 and S133). Lake stage increased by 0.09 feet over the past week and is 0.79 feet higher than it was a month ago and 0.99 feet higher than it was a year ago (Figure 1). The Lake is in the Low Flow sub-band (Figure 2) but 0.17 feet from the bottom of the Intermediate sub-band. According to RAINДАР, 2.24 inches of rain fell directly over the Lake during the past seven days. With the exception of a few areas along the lower east coast and most of the Kissimmee River valley, the surrounding watershed experienced similar or greater rainfall amounts (Figure 3).

Based on USACE reported values, current Lake inflow is approximately 8,522 cfs as detailed below.

Structure	Flow cfs
S65E	4065
S154	143
S84 & 84X	1571
S71	471
S72	150
C5 (Nicodemus slough dispersed storage)	-84
S191	641
S133 PUMPS	107
S127 PUMPS	74
S129 PUMPS	51
S131 PUMPS	22
S135 PUMPS	183
Fisheating Creek	1128
S2 Pumps	0
S3 Pumps	0
S4 Pumps	0

Current Lake outflow is approximately 8,334 cfs with 6,181 cfs exiting at S77, 1,986 cfs exiting at S308 and 120 cfs exiting the L8 canal through Culvert 10A. Additionally, approximately 47 cfs exited through S352 and no water exited through S351 or S354. Corrected evapotranspiration value based on the L006 weather platform solar radiation data for this past week was 1,929 cfs.

Change in elevation equivalents and average weekly flows for major structures are presented in Figure 4. Weekly average values for S77 and S308 are based on USGS data for the below structure gauges.

September 6 and 7 chlorophyll data indicate the presence of bloom level concentrations (40 ppb or greater) at five stations, two in the nearshore zone and three in the pelagic zone (Figure 5). All of the six stations at which microcystin-LR are collected and measured by ELISA (as opposed to microcystin samples as measured by summing all microcystin congeners as done by DEP) had values exceeding the limit of detection of 0.2 ppb.

The most recent satellite images (MODIS for September 30 and October 2) (Figure 6) indicate bloom conditions may be intensifying in the western and southern areas of the Lake. On Friday, September 30, District staff also reported a light surface bloom in these areas during a helicopter flight.

Water quality collected on September 6 and 7 indicate an increase in both total phosphorus and total suspended solids in the pelagic zone and overall (Figure 7). No major change occurred in nearshore concentrations for either parameter.

The FWC snail kite coordinator reported that during the September Lake Okeechobee survey twenty-five new nests were identified, all of them in the cattail treatment areas in moonshine bay (Figure 8). There are currently forty-one active nest on the Lake. A record ninety-four successful kite nests have been recorded for Lake Okeechobee this season out of a total of 222 nesting attempts (42%).

Water Management Recommendations

Lake stage continued to increase this past week and is now 0.28 feet above the top of the preferred stage envelope (15.5 feet NGVD) and 0.17 feet from the bottom of the Intermediate sub-band. Future short-term recommendations are to lower Lake levels. From an ecological perspective, the Lake is too high for this time of year and levels have been too high since the February rain event resulting in a loss of submerged aquatic vegetation (SAV) and increased cyanobacterial blooms and associated toxins. If elevated Lake levels persist into the next growing season we expect additional damage to SAV and a resurgence of the bloom conditions that have characterized this past wet season.

The goal should be to decrease Lake stage as levels have moved past the top of the preferred stage envelope and if Hurricane Matthew passes over or near the Lake the potential exists for a continued rise into a range where additional ecological damage may occur. Near optimal Lake stages will be necessary this coming spring and summer to provide conditions conducive to the reestablishment of the SAV acreage lost this year due to high Lake stages.

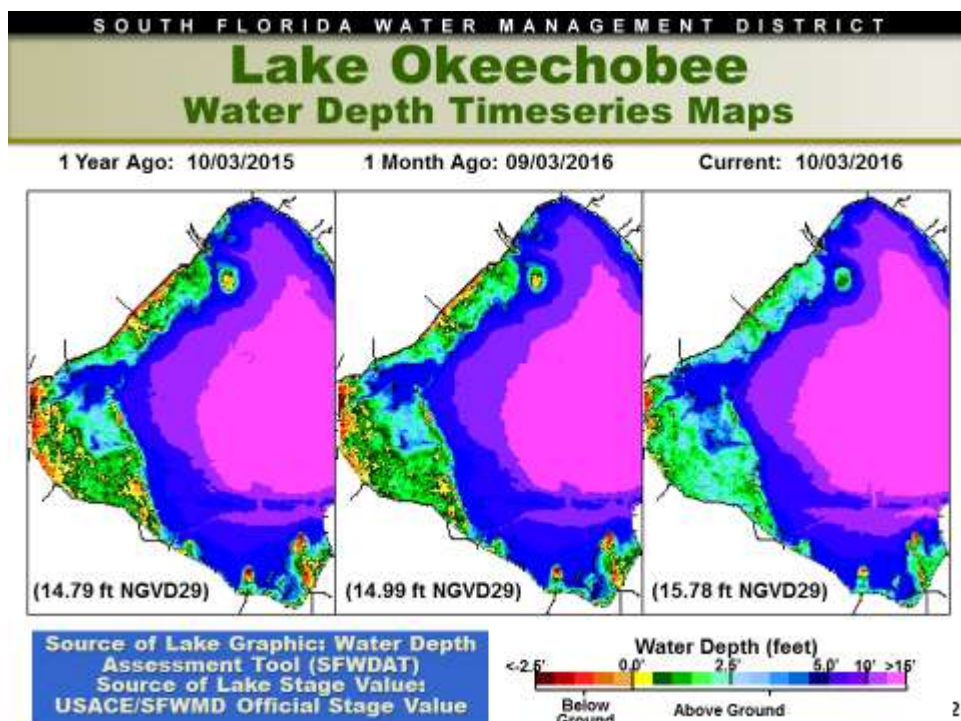


Figure 1

Lake Okeechobee Water Level History and Projected Stages

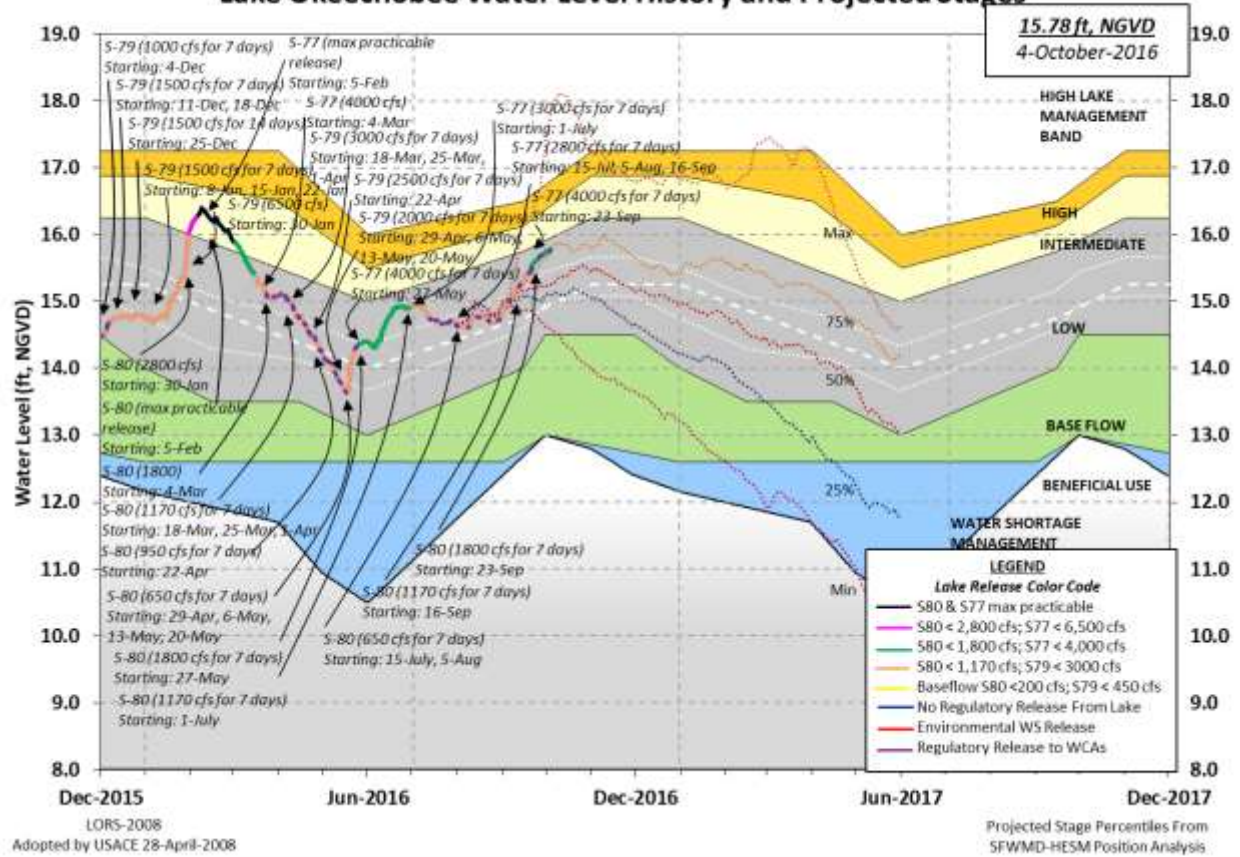


Figure 2

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES
 FROM: 1130 EST, 09/27/2016 THROUGH: 1130 EST, 10/04/2016

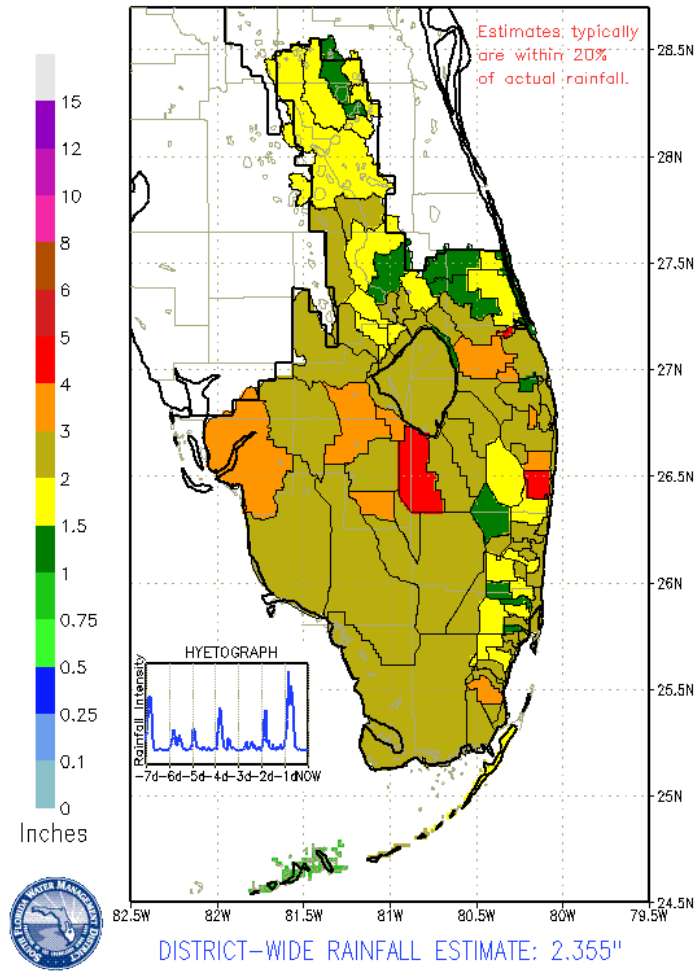


Figure 3

INFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S65E	4999	0.160
S71 & 72	787	0.025
S84 & 84X	1511	0.048
Fisheating Creek	950	0.030
Rainfall	N.A.	0.187
OUTFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S77	5871	0.187
S308	2463	0.079
S351	0	0.000
S352	91	0.003
S354	0	0.000
L8	148	0.005
ET	1929	0.062

Figure 4



SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee Water Quality



Parameter		Jul 2016	Aug 2016	Sep 2016
TP ppb	Nearshore	96	89	90
	Pelagic	114	105	121
	Lakewide	104	97	105
TSS ppm	Nearshore	11	13	17
	Pelagic	15	17	25
	Lakewide	13	15	21

Figure 7

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee Snail Kites

Mid September Survey

- Total Nests – 222
- Successful – 94
- Still Active – 41 (most with eggs)
- Failed – 87

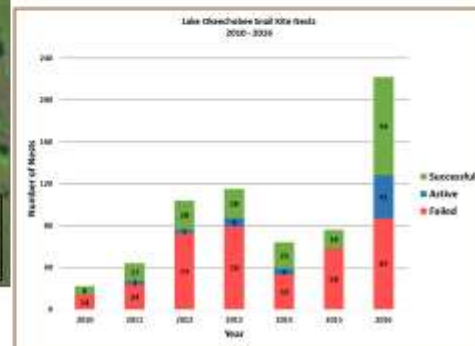


Figure 8

Lake Istokpoga

The Lake Istokpoga regulation schedule began its ascension towards winter pool stage of 39.50 feet NGVD on August 2, 2016. Lake stage is 39.19 feet NGVD and is currently 0.02 feet below its regulation stage of 39.21 feet NGVD (Figure 9). Average flows into the Lake from Arbuckle and Josephine creeks were 953 cfs and 355 cfs respectively, which is a decrease in total flow from the previous week. Average

discharge from S68 and S68X this past week was 1,338 cfs, an increase from the preceding week. According to RAINDAR, 2.05 inches of rain fell in the Lake Istokpoga watershed during the past seven days.

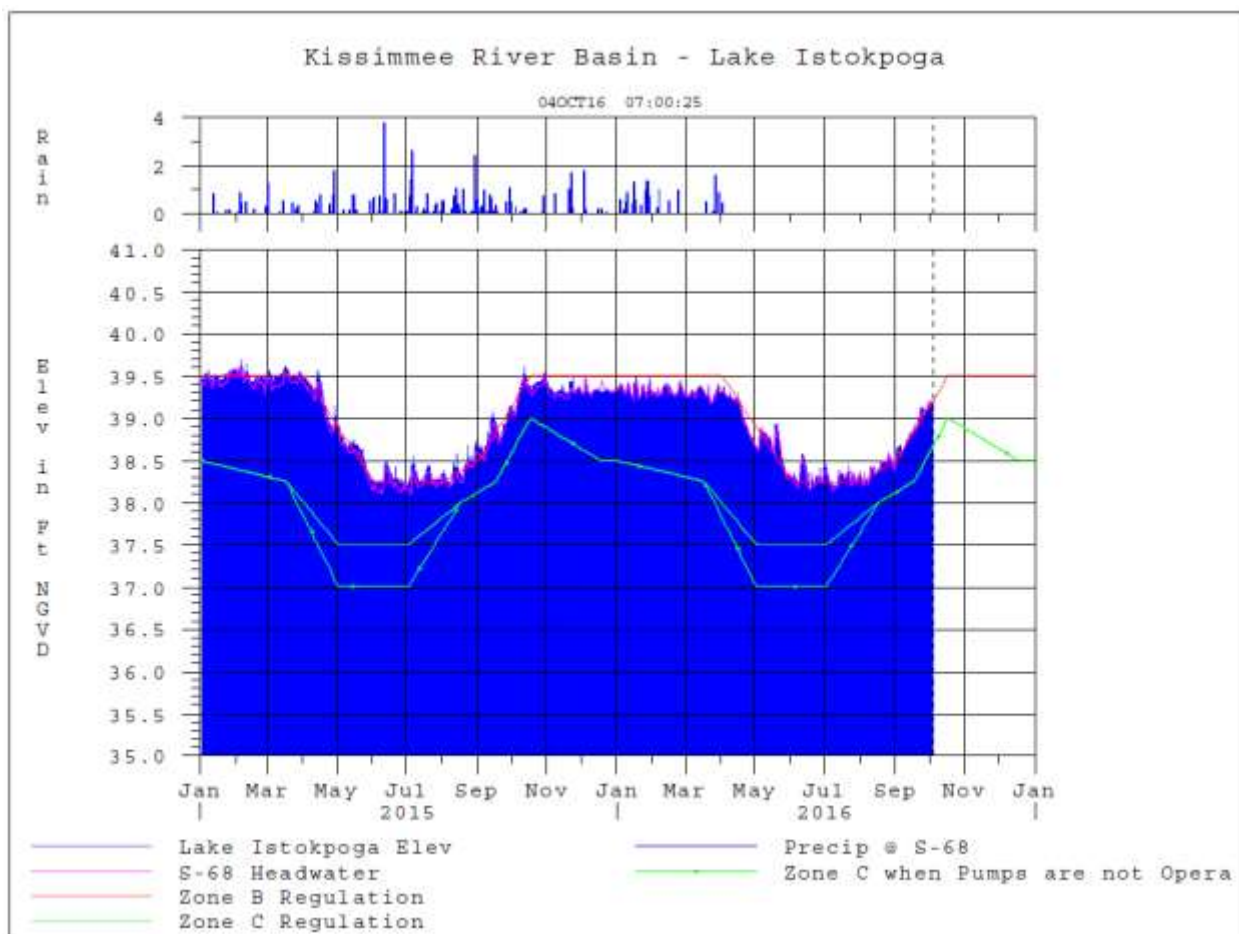


Figure 9

ESTUARIES

St. Lucie Estuary

Over the past week, provisional flows averaged about 2,193 cfs at S-80, 2,463 cfs downstream of S-308, 266 cfs at S-49 on C-24, 240 cfs at S-97 on C-23, and 208 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 669 cfs (Figures 1 and 2). Total inflow averaged about 3,576 cfs last week and 2,981 cfs over last month.

Over the past week, salinity decreased throughout the estuary (Table 1, Figures 3 and 4). The seven-day moving average salinity of the water column at the US1 Bridge is about 3.1. Salinity conditions in the middle estuary are in the poor range for the adult eastern oyster.

Table 1. Seven-day average salinity at three monitoring stations in the St. Lucie Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

Sampling Site	Surface	Bottom	Envelope
HR1 (N. Fork)	1.4 (2.5)	2.3 (6.4)	NA ¹
US1 Bridge	2.5 (4.6)	3.8 (EM)	10.0-26.0
A1A Bridge	8.4 (EM)	18.3 (21.1)	NA

¹Envelope not applicable, ²Equipment Malfunction

Caloosahatchee Estuary

During the past week, provisional flows averaged approximately 5,871 cfs downstream of S-77, 5,887 cfs at S-78, and 7,321 cfs at S-79. Flows at S-79 are estimated at 7,250 cfs for the past five days due to lost communications with recorder (communications with USACE confirmed flows between 7,000 cfs to 7,500 cfs). Average inflow from tidal basin tributaries is estimated to be 1,242 cfs (Figures 5 and 6). Total inflow averaged 8,563 cfs last week and 6,621 cfs over last month.

Over the past week, salinity decreased throughout the estuary and remained about fresh to Cape Coral Bridge (Table 2, Figures 7 and 8). The seven-day average salinity values are within the good range for adult oysters at Sanibel, in the fair range at Shell Point and in the poor range at Cape Coral (Figure 9). The 30-day moving average surface salinity at Val I-75 and Ft. Myers are unavailable. Salinity conditions at Val I-75 are still in the good range for tape grass.

Table 2. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for tape grass (*Vallisneria americana*) at Val I-75 and for adult eastern oysters (*Crassostrea virginica*) elsewhere.

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	0.2 (0.2)	0.2 (0.2)	NA ¹
Val I75	0.2 (0.2)	0.2 (0.2*)	0.0-5.0 ²
Ft. Myers Yacht Basin	0.2 (0.2)	0.2 (0.2)	NA
Cape Coral	0.4 (0.9)	0.6 (1.5)	10.0-30.0
Shell Point	7.5 (10.4)	11.2 (16.5)	10.0-30.0
Sanibel	20.3 (EM)	23.3 (27.1)	10.0-30.0

¹Envelope not applicable, ²Envelope is based on a 30-day average, ³Equipment Malfunction.

*Val I75 is temporarily offline due to site construction,
Salinity values are estimated using models developed for this site.

Monitoring data collected by the River, Estuary and Coastal Observing Network of Sanibel-Captiva Conservation Foundation using continuous sensors are summarized in Table 3 as concentration ranges of Chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 3. Weekly ranges of Chlorophyll *a* (a measure of algal biomass) and dissolved oxygen concentrations at three monitoring stations maintained by the Sanibel-Captiva Conservation Foundation.

	RECON Monitoring Stations		
	Beautiful Island	Ft. Myers	Shell Point
Chlorophyll <i>a</i> (µg/l)	5.15 – 11.4	5.27 – 5.73	2.7 – 6.0
Dissolved Oxygen (mg/l)	3.3 – 4.7	4.1 – 5.8	4.5 – 6.3

The Florida Fish and Wildlife Research Institute reported on September 30, 2016, that *Karenia brevis*, the Florida red tide organism, was observed in background to medium concentrations in four samples collected from Lee County.

Water Management Recommendations

Given the current estuarine conditions, there are no ecological benefits associated with additional releases from Lake Okeechobee.

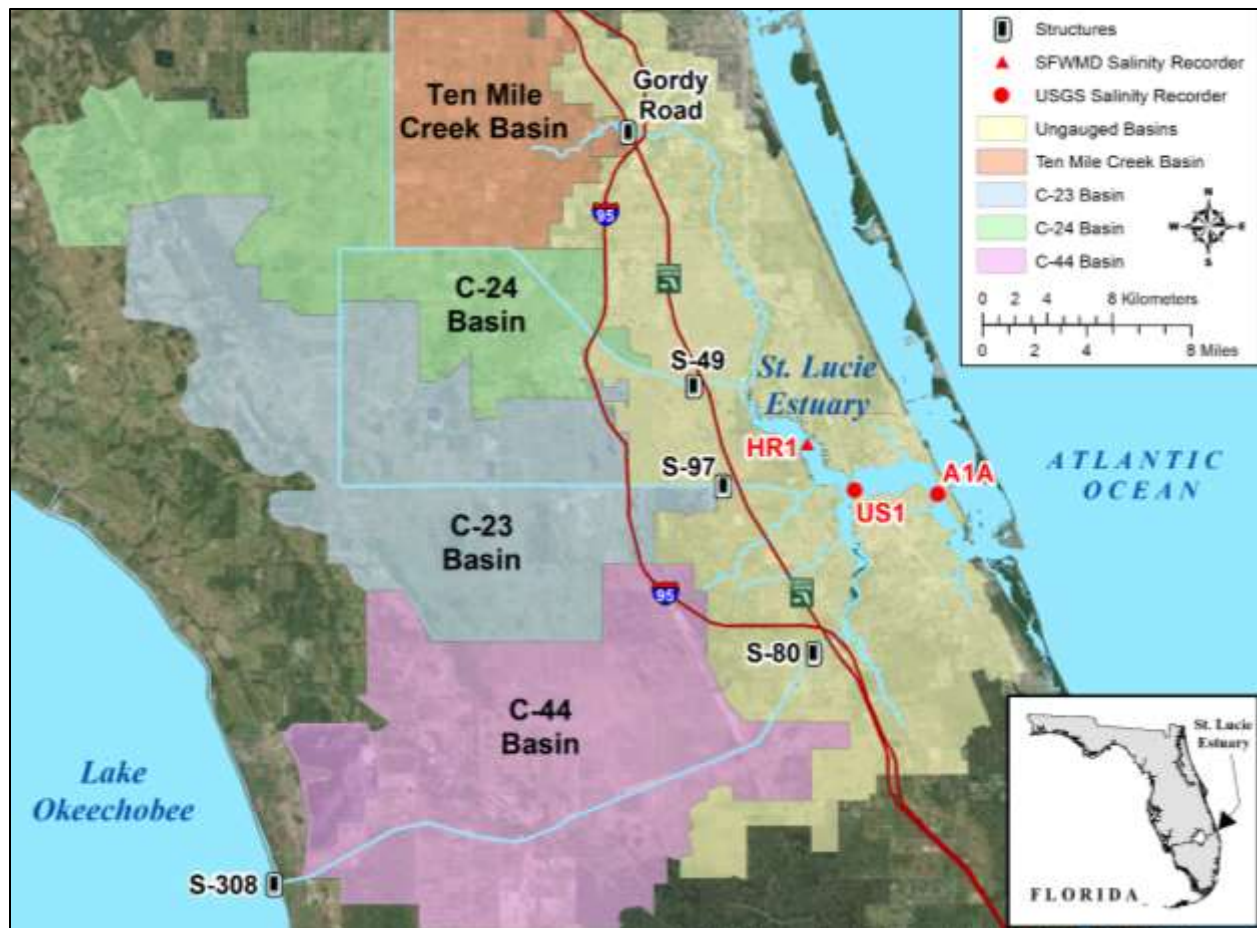


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

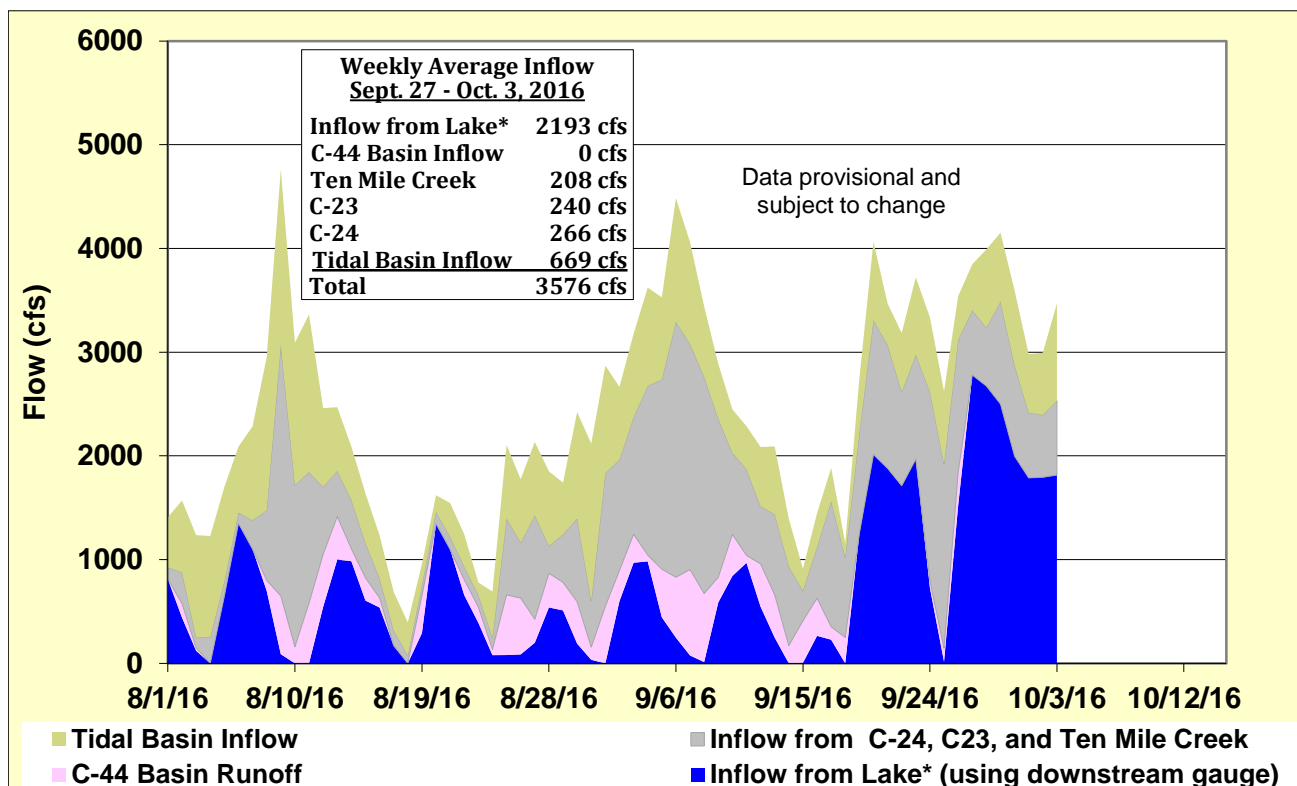


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

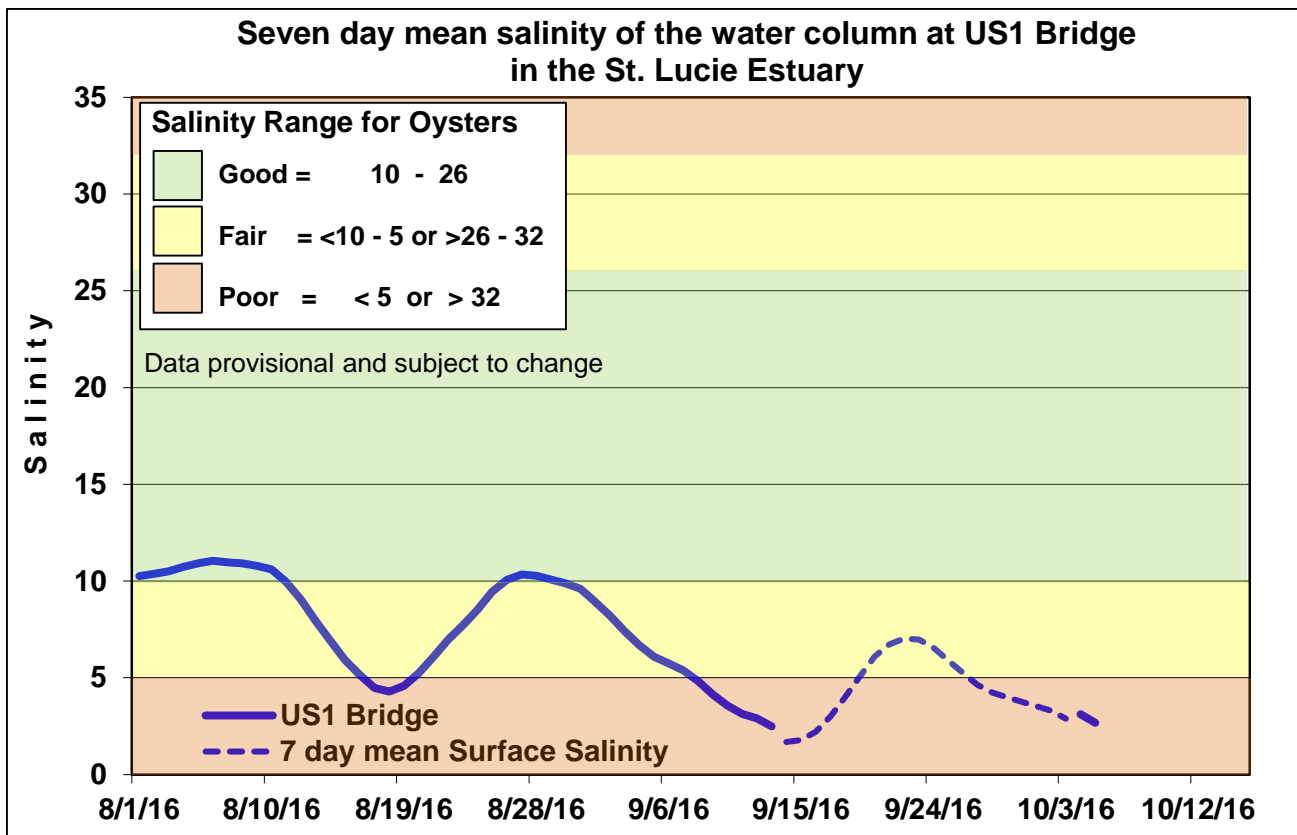


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

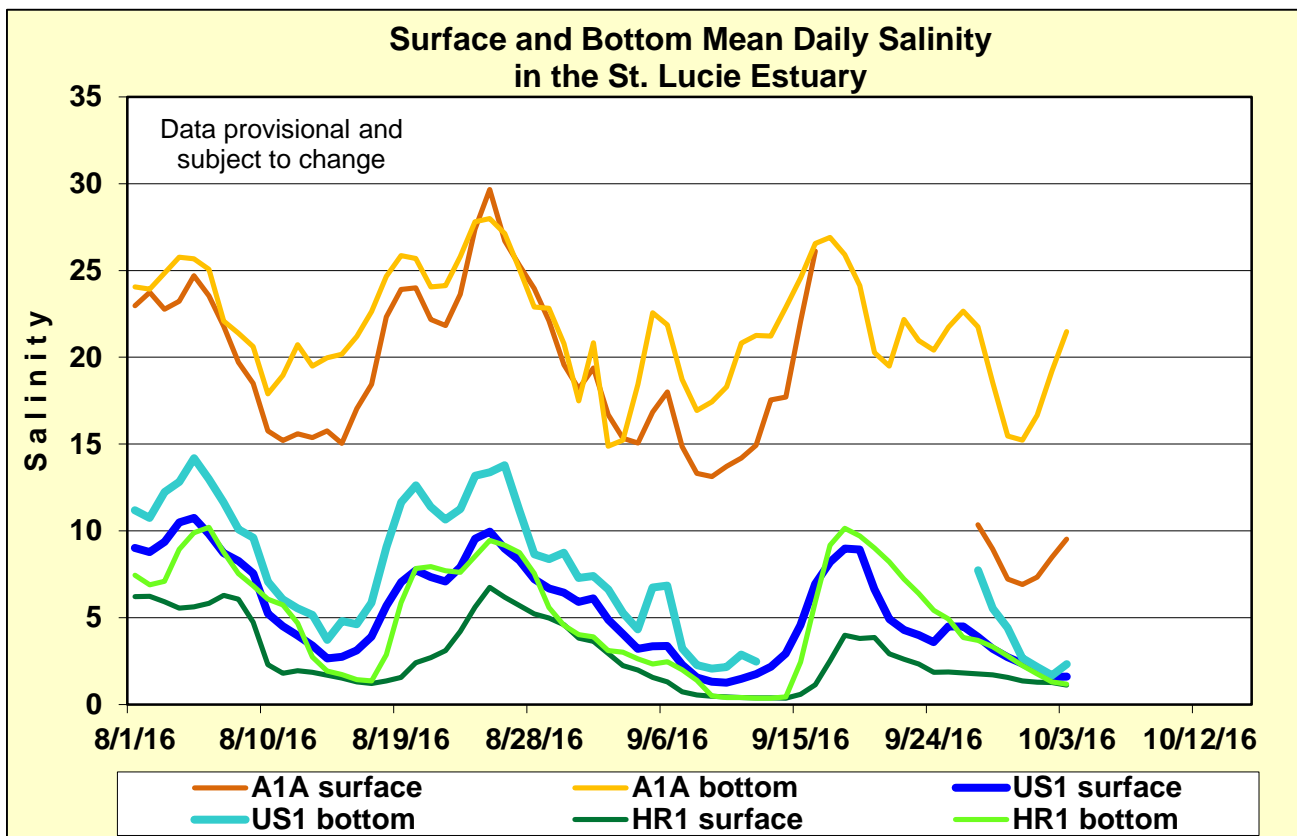


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

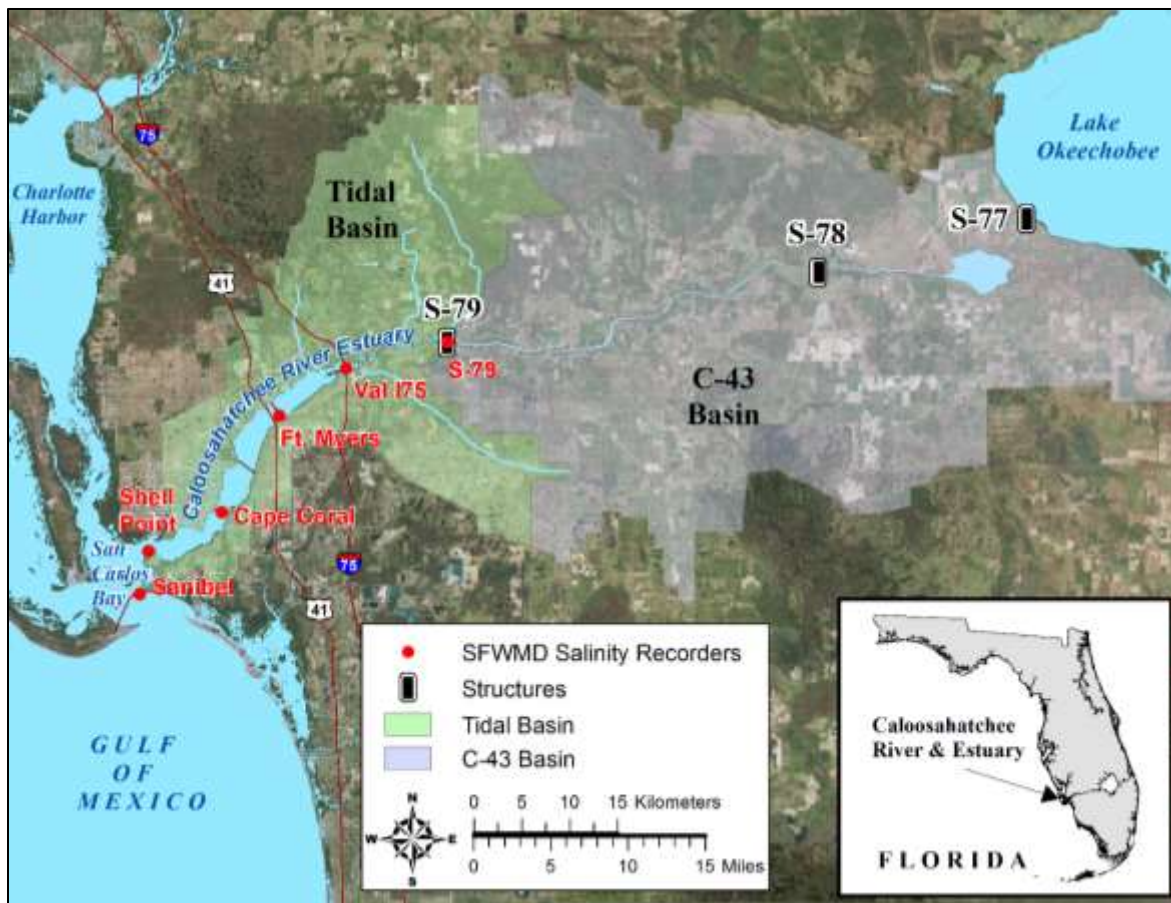


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

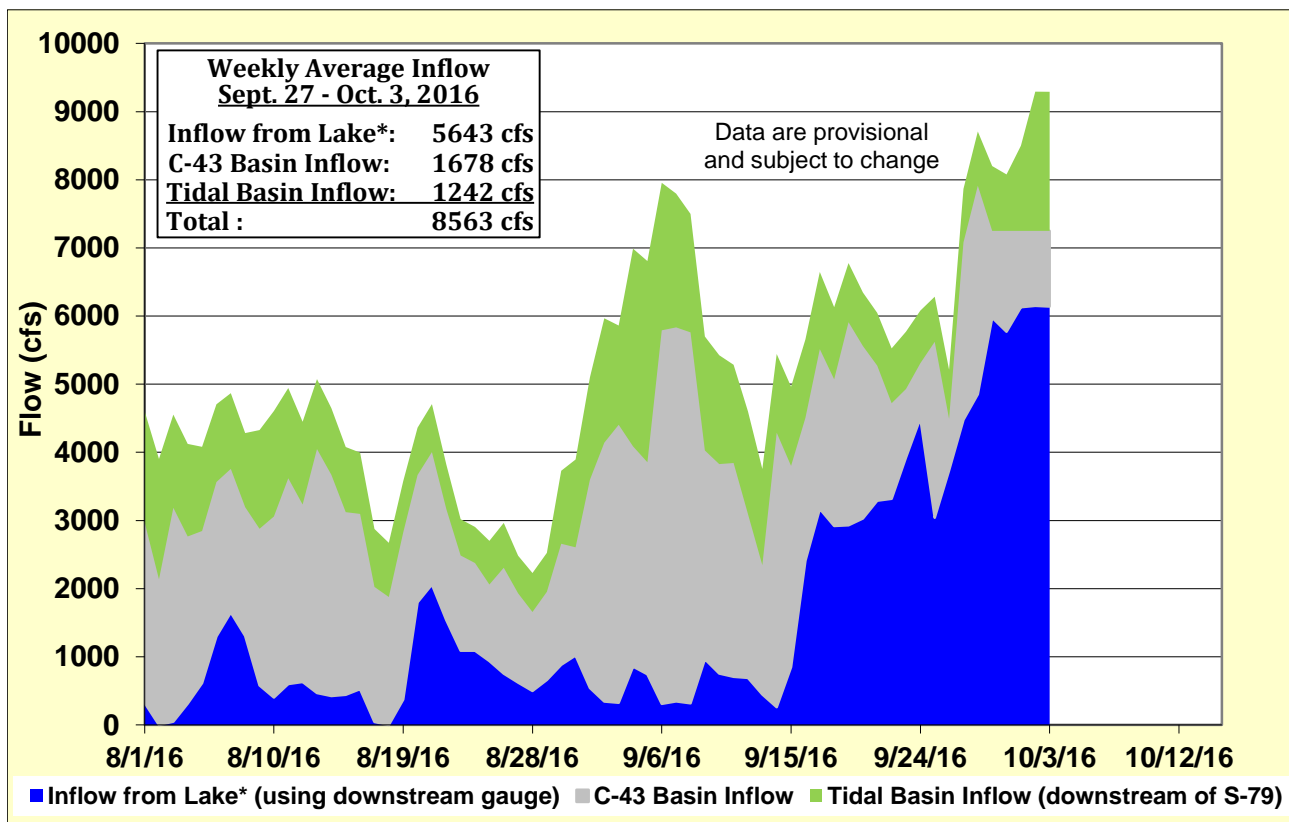


Figure 6. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

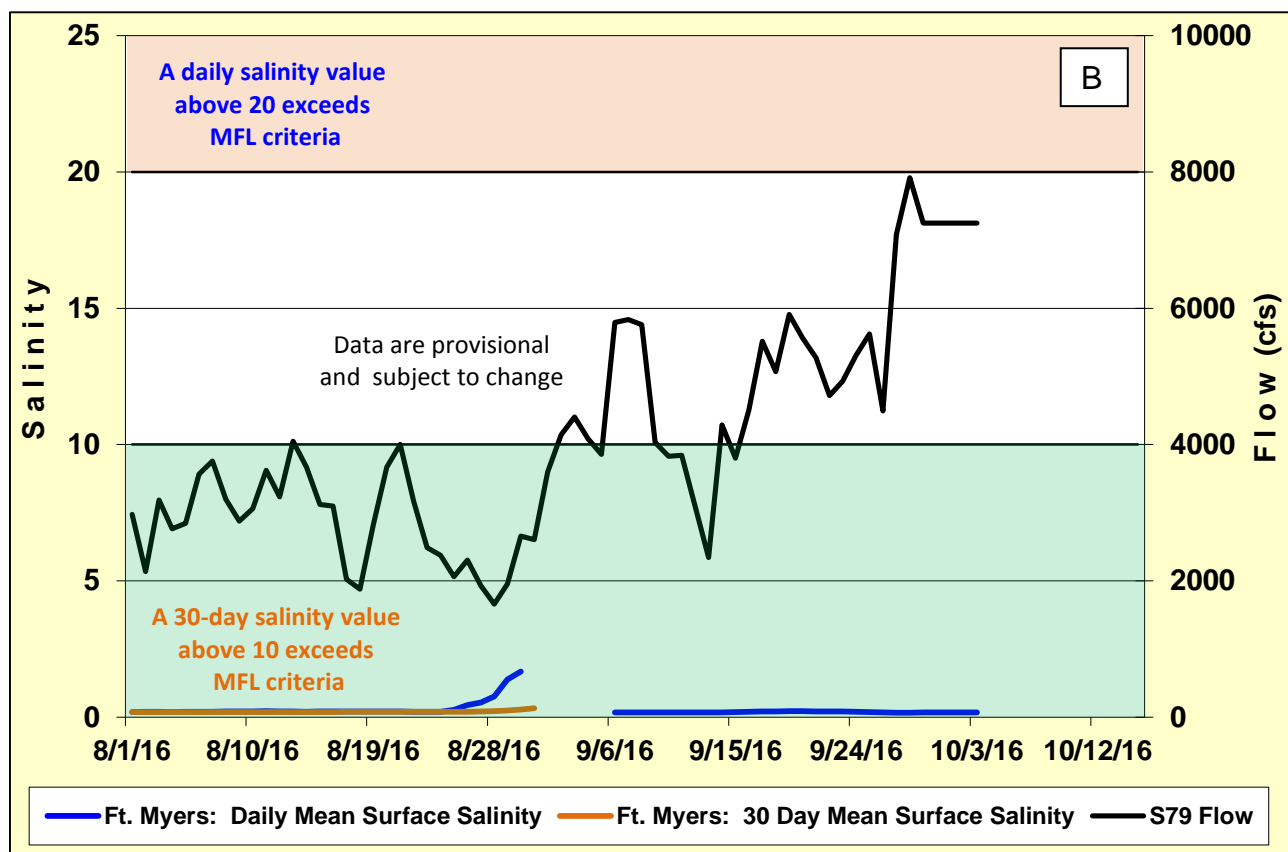
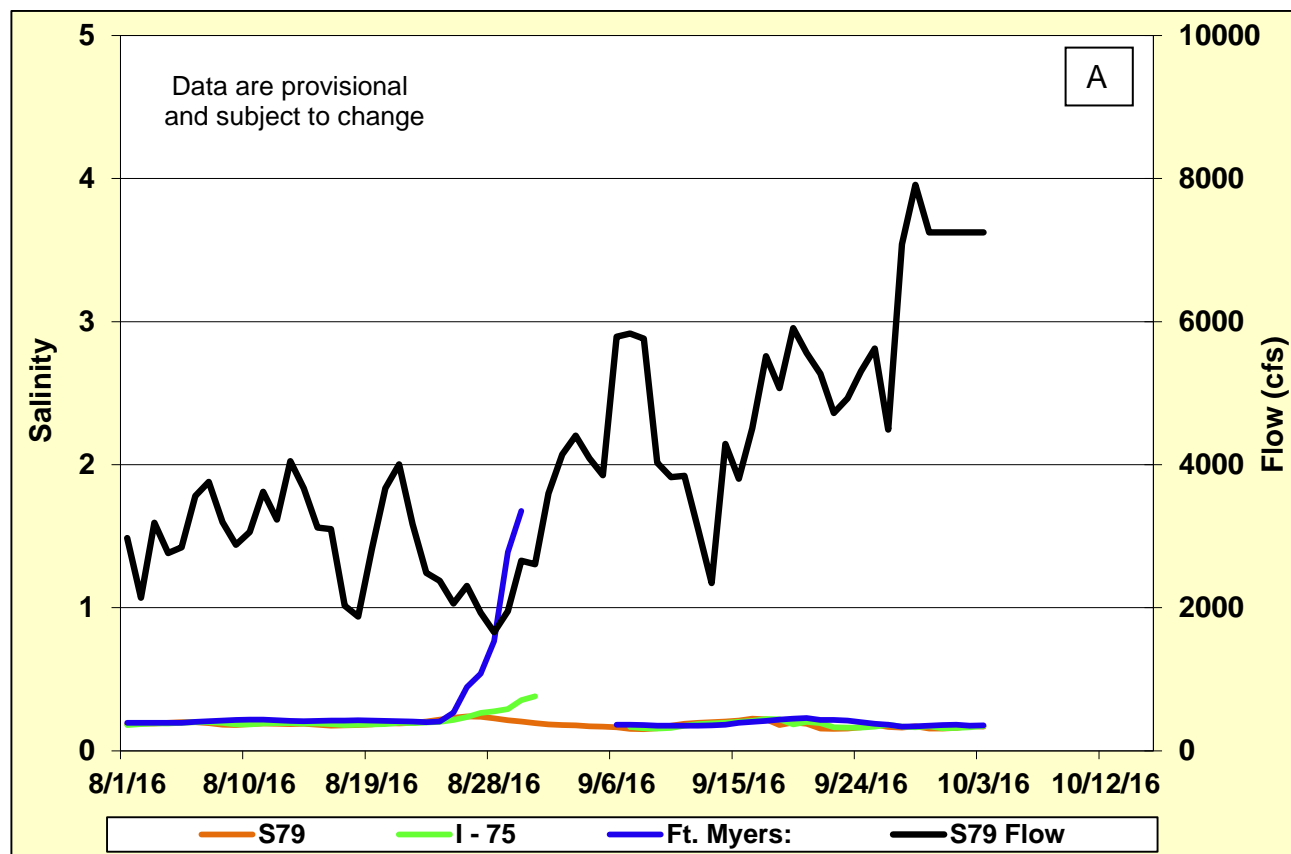


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

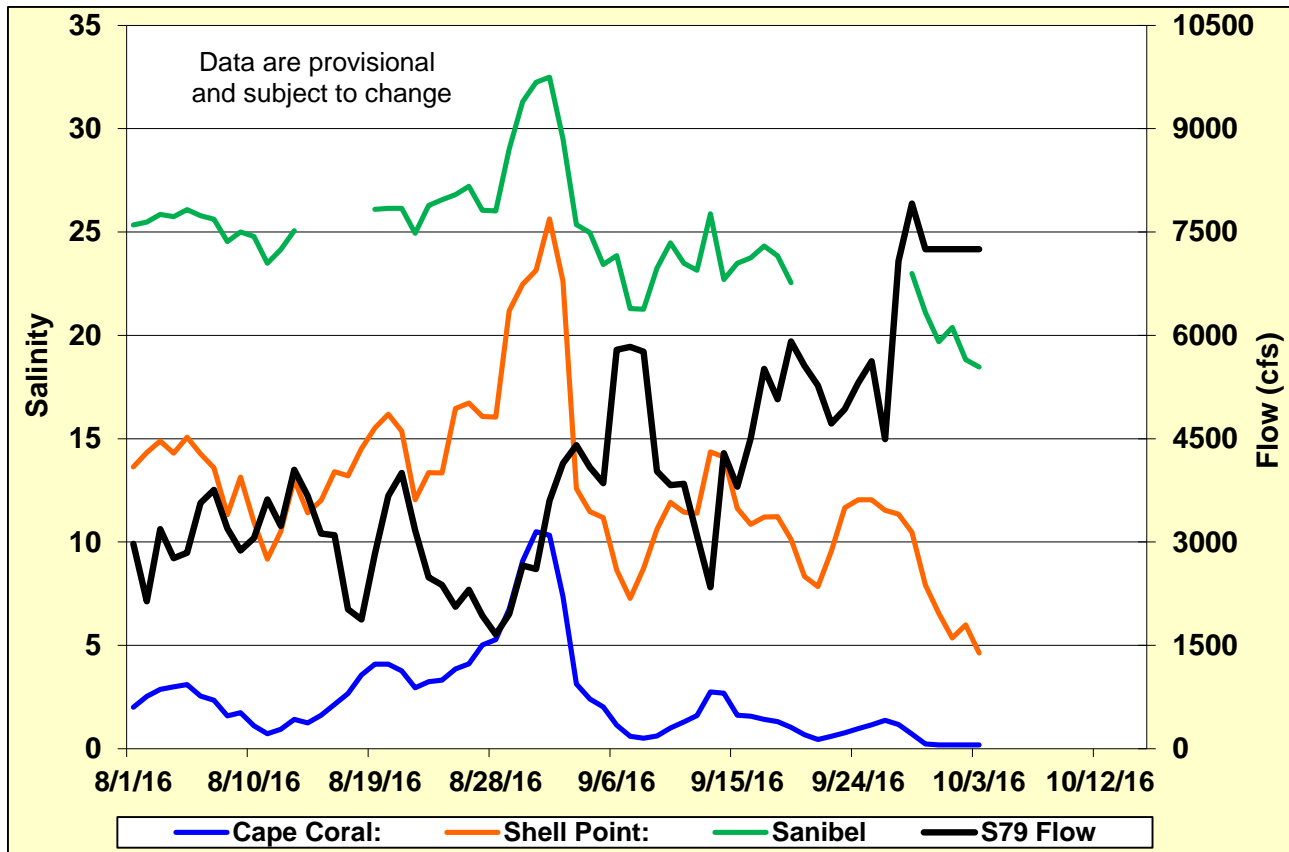


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

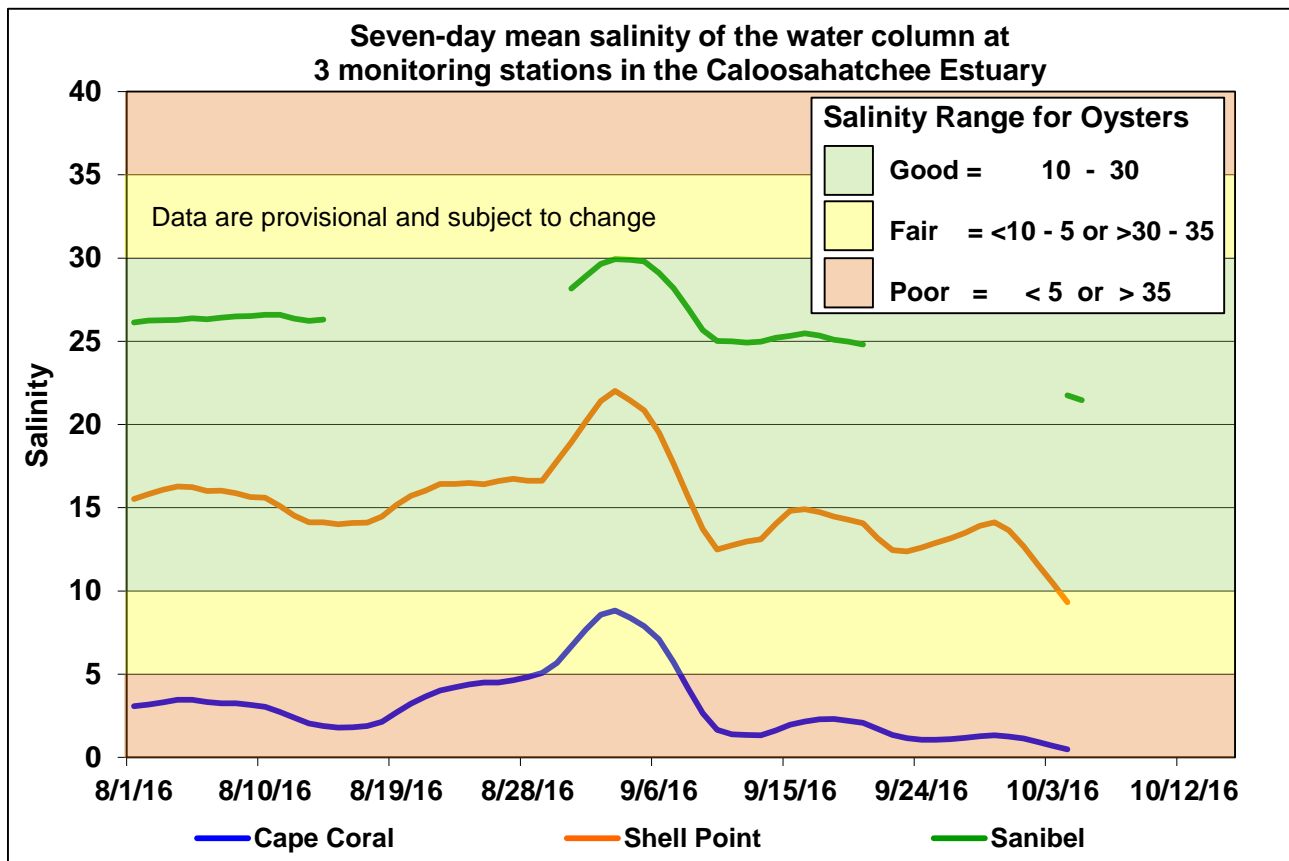


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

Appendix A

Water quality mapping using an onboard flow through system

The flow through system consists of an intake ram attached to the transom of a boat, a flow meter, Garmin GPSMap_78S, YSI 6600 multi-parameter water quality instrument, C3 submersible fluorometer, and laptop computer with Streamline GEO software (Figure A1). The YSI 6600 was set up to record temperature, salinity, turbidity, dissolved oxygen, and chlorophyll *a*. The C3 measures temperature, colored dissolved organic matter, chlorophyll *a*, and turbidity. The intake ram was set at 0.5 m depth. Streamline Geo software permitted integration of the GPS and surface water data into an ArcGIS shapefile used to display surface water properties and facilitate the post-processing of spatial data. The GPS, YSI, and C3 recorded spatial and hydrographic information at 5-s intervals. Discrete water samples were also taken for analysis of chlorophyll *a* following the SFWMD's Standard Operating Procedures. Laboratory determination of chlorophyll *a* concentrations will be used to calibrate in situ values of chlorophyll *a* reported in the field by the optical chlorophyll probe.

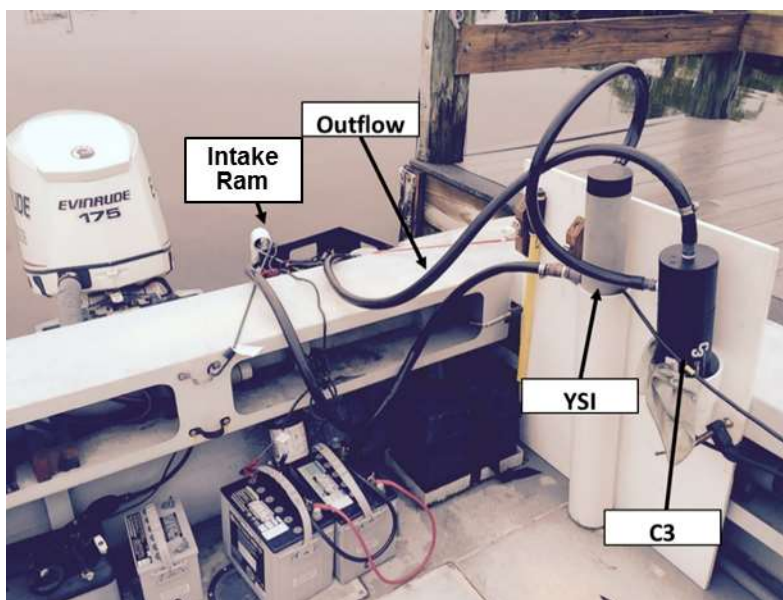


Figure A1. The flow-through system used for water quality mapping.

A map showing the water quality survey track in the St. Lucie Estuary taken on September 30, 2016 (Figure A2). Values for salinity, chlorophyll and turbidity are shown on Figure A3 and Figure A4.



Figure A2. Water quality mapping track with river kilometers away from the Roosevelt Bridge (US1).

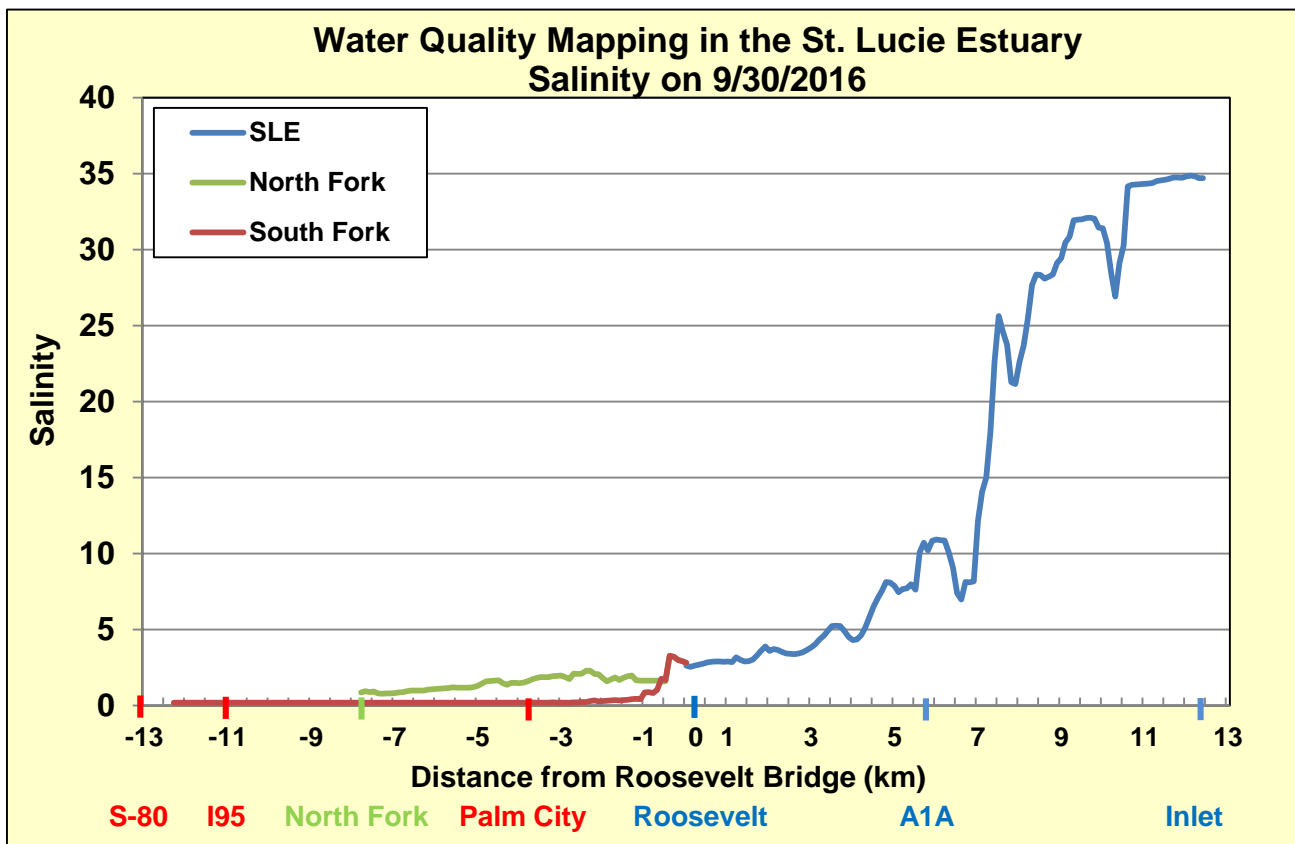


Figure A3. Water Quality Mapping salinity results from S-80 to the Inlet on September 30, 2016.

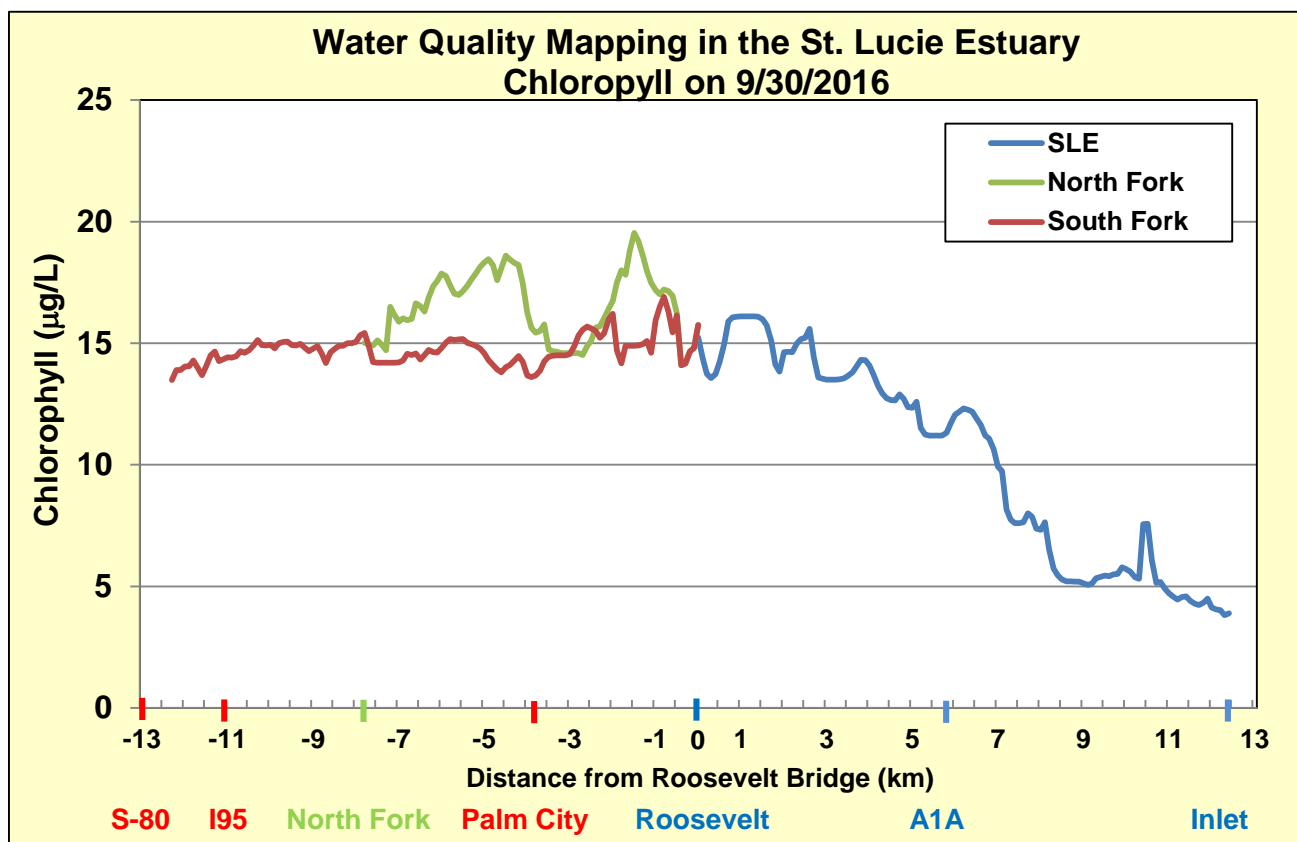
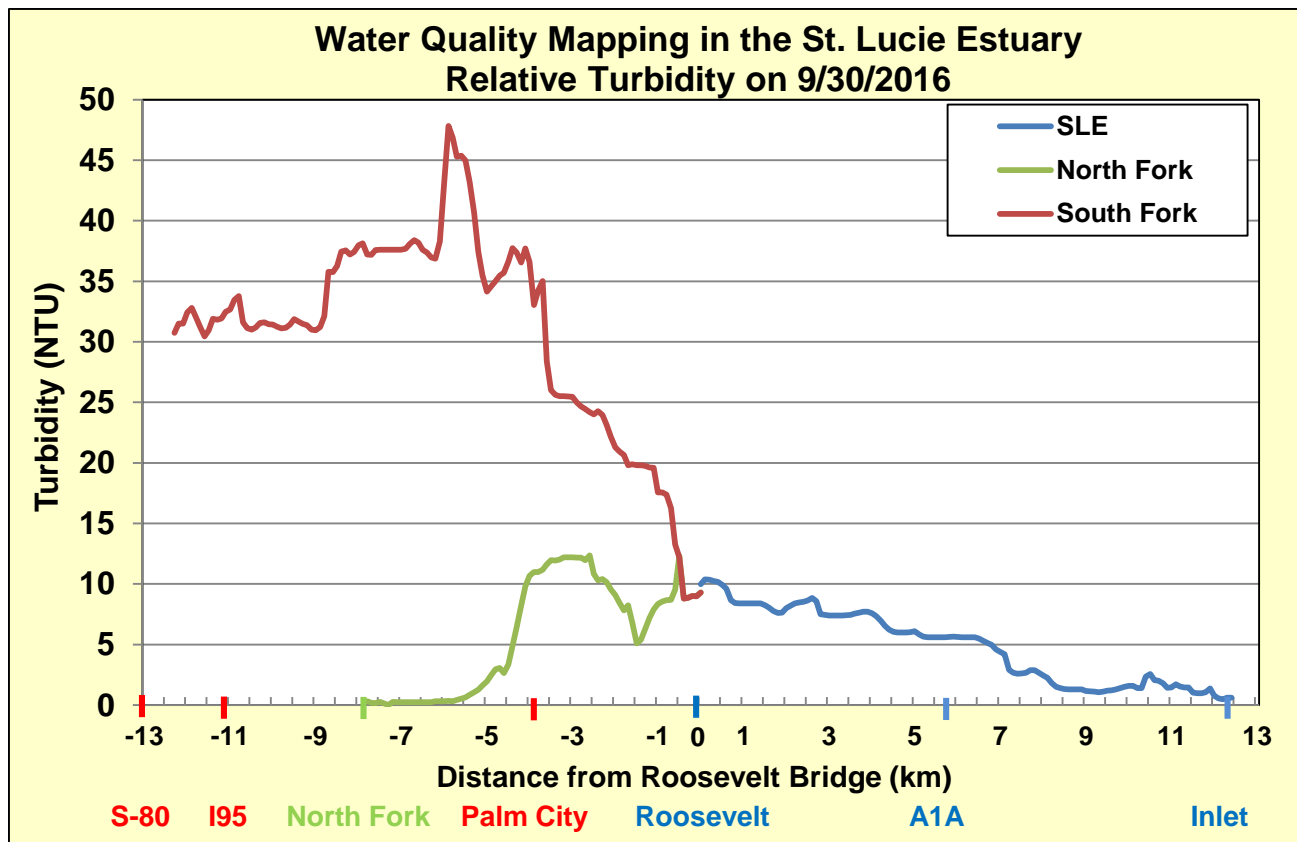
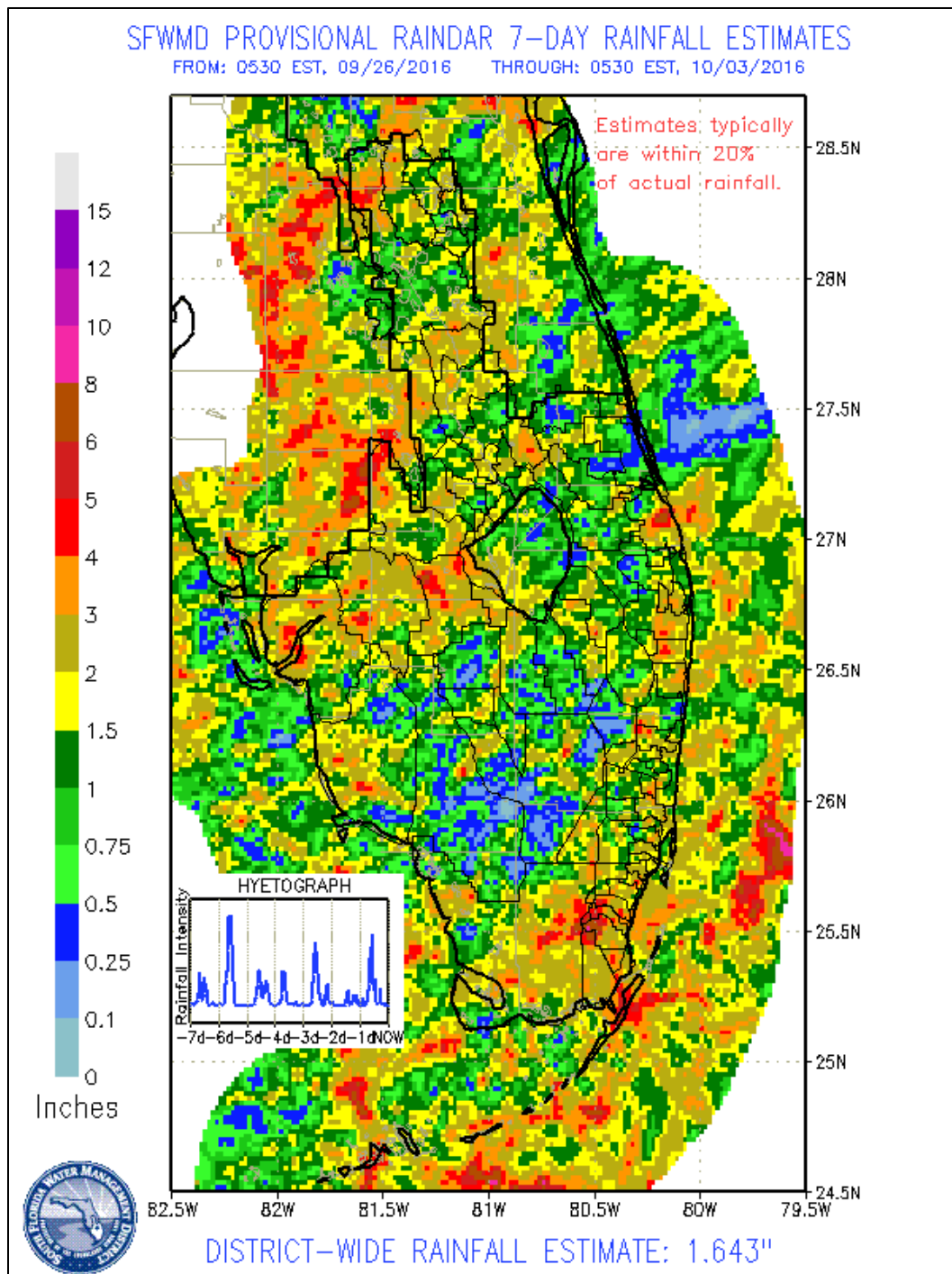


Figure A4. Water Quality Mapping relative turbidity and chlorophyll results from S-80 to the Inlet on September 30, 2016.

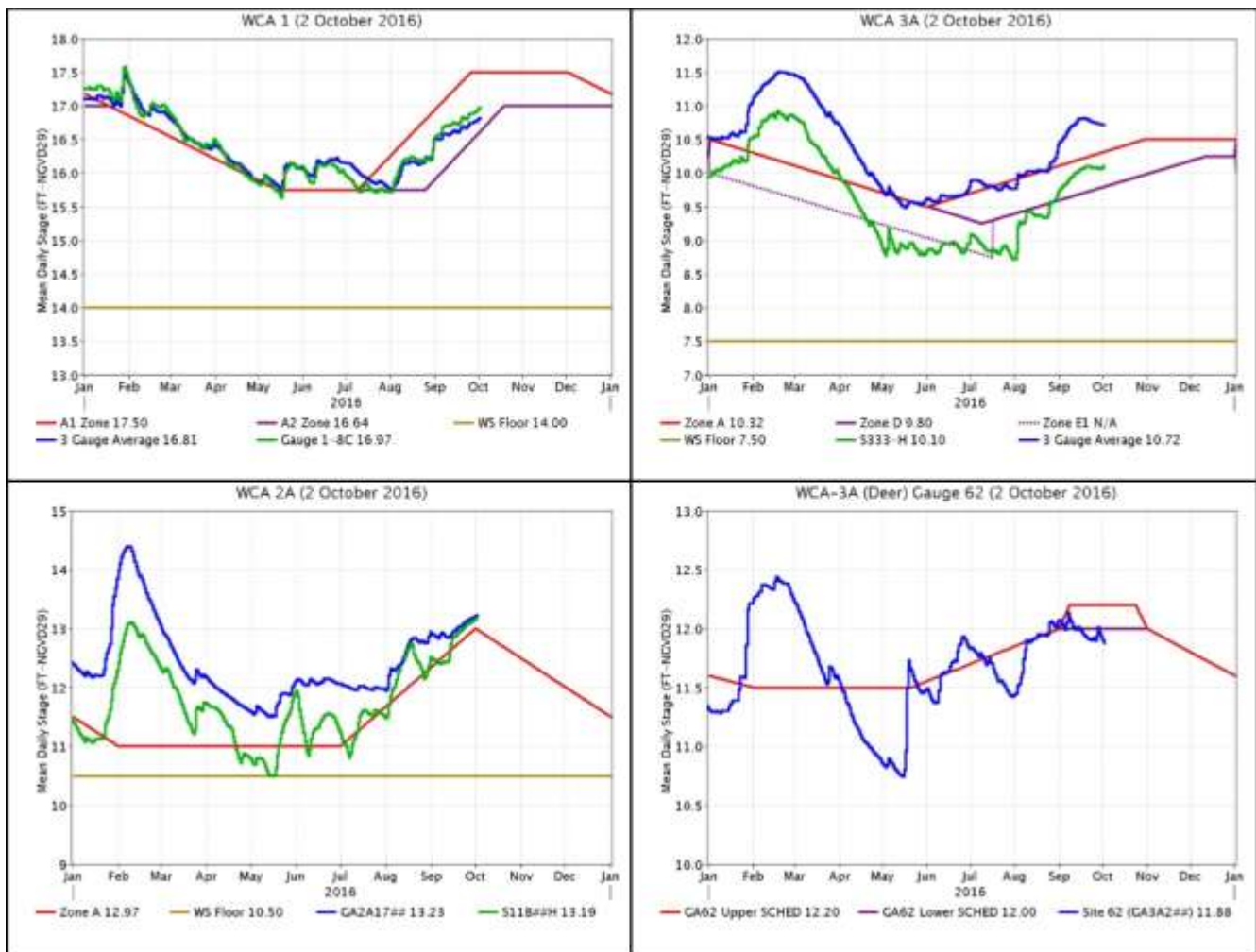
GREATER EVERGLADES

Rainfall was moderate with only two of the regions averaging less than an inch of rain. The highest maximum rainfall was over seven inches within ENP. This week's pan evaporation of 1.15 inches was lower than the pre-project average of 1.21 inches.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	1.37	0.07
WCA-2A	0.67	0.09
WCA-2B	2.08	0.03
WCA-3A	0.99	-0.03
WCA-3B	2.00	0.09
ENP	2.02	0.12

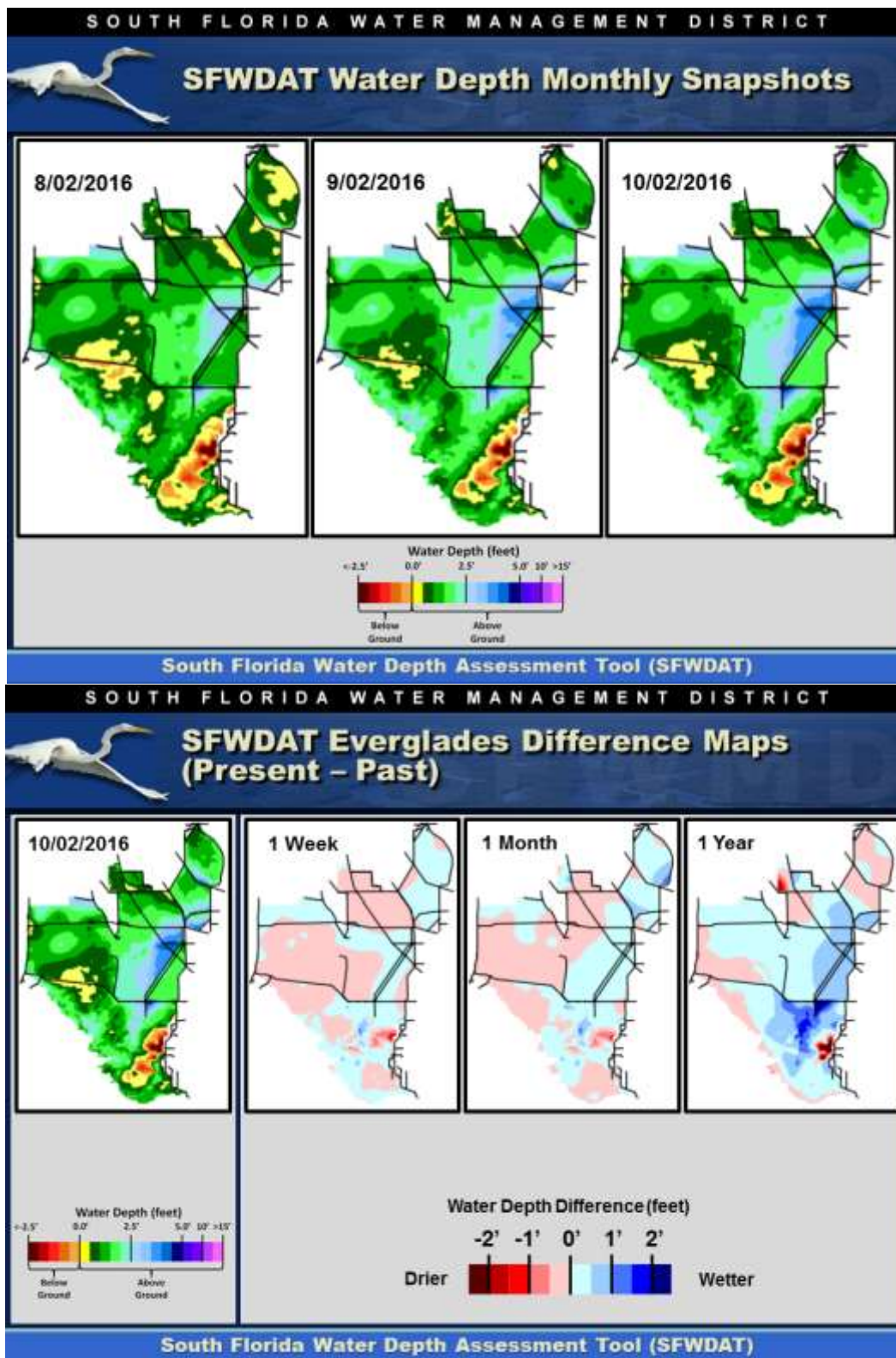


Regulation Schedules: Stages remain above regulation for two of the four areas. The WCA-1 three-gauge average is -0.69 feet below zone A1 and 0.17 feet above zone A2, and the northwestern WCA-3A gauge stage (gauge 62) is -0.12 feet below the lower schedule. The other two areas remain above schedule: WCA-2A stage is 0.26 feet above regulation and the WCA-3A three-gauge average stage is 0.40 feet above regulation.



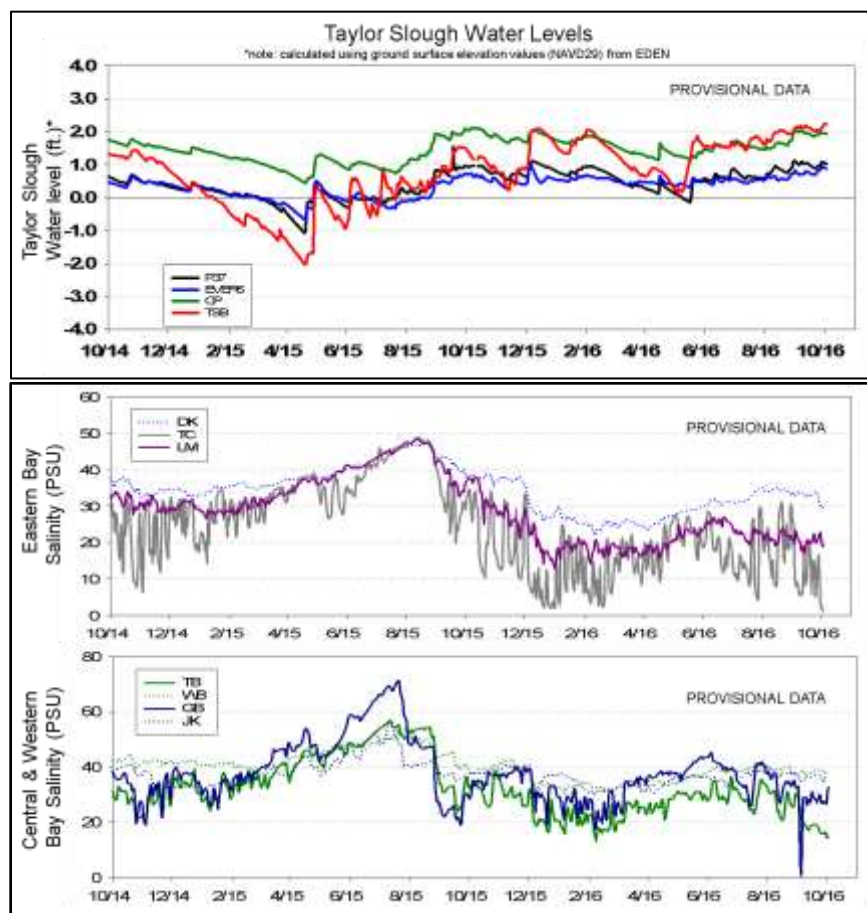
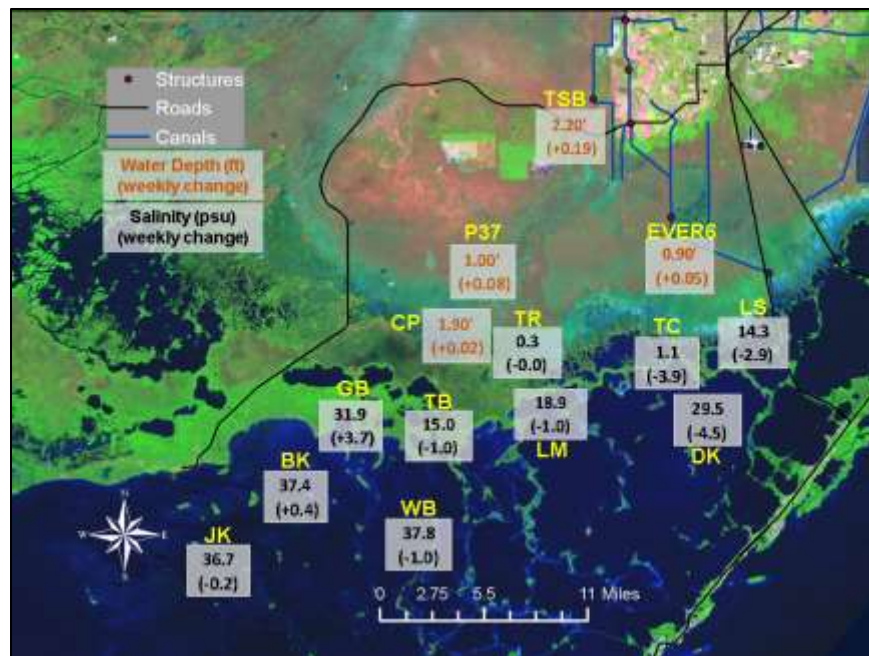
Water Depths and Changes: Water levels are mostly higher than those in September and August. Two notable exceptions are southern Big Cypress and the area between Shark and Taylor Sloughs, which are slightly drier than a month ago. Water depths at monitored gauges other than in WCA-2B range from 1.38 feet to 2.82 feet.

Stage changes were mixed again last week, but only the monitored gauges in WCA-3A showed weekly decreases. Individual gauge changes ranged from -0.05 feet (WCA-3A) to 0.13 feet (WCA-3B). Stages in WCA-2B, -3B, and Shark River Slough are mostly higher than a month ago and a year ago, but WCA-1, and -2A are wetter than a month ago and drier than a year ago.

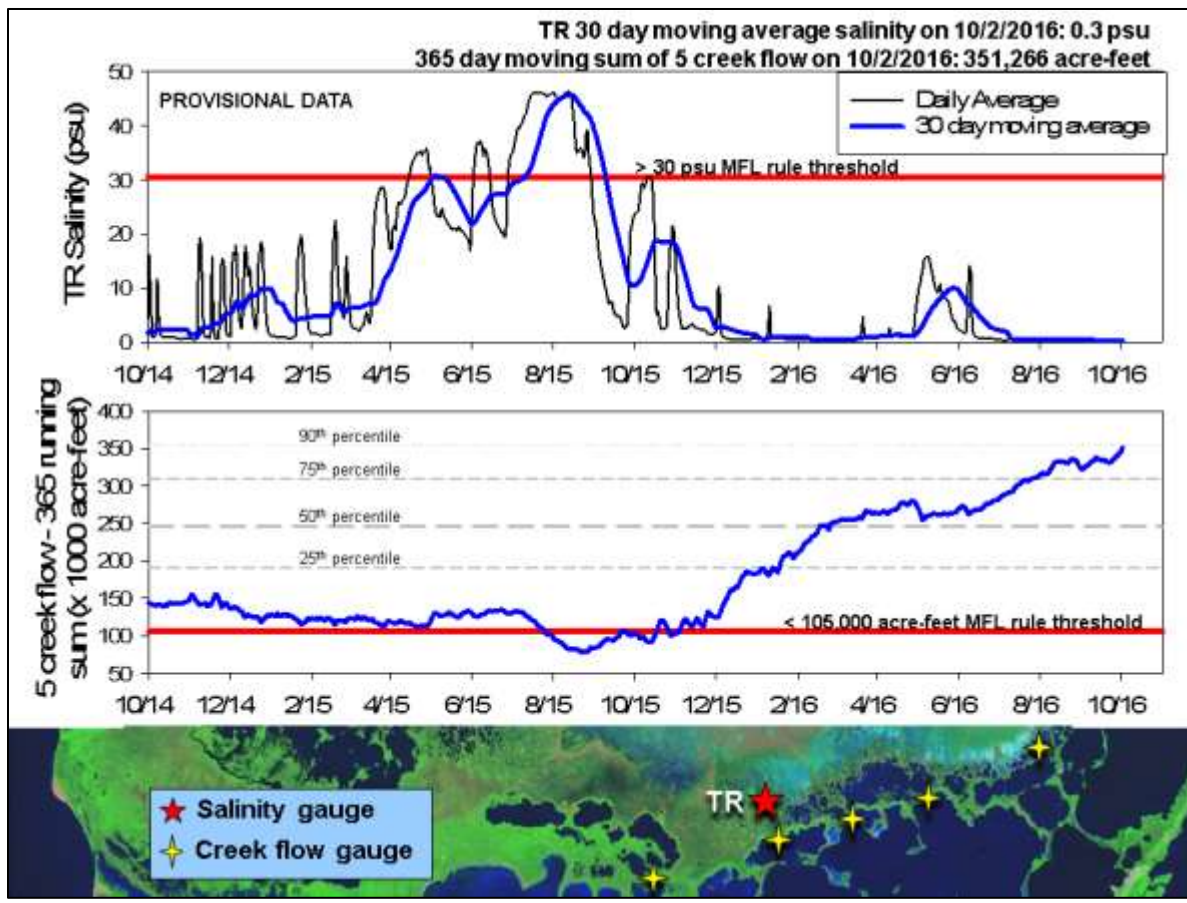


Taylor Slough and Florida Bay: Water levels increased this past week in Taylor Slough and the C-111 panhandle area. All areas are still higher than a month ago and are average to six inches above average with northern Taylor Slough being the furthest from average.

Salinities in Florida Bay mostly decreased this past week with only the western nearshore areas increasing. Daily average salinities now range from near fresh to 38 psu with the highest salinity still in central Florida Bay.



Florida Bay MFL: The MFL sentinel site TR in the mangrove zone remains near fresh at 0.3 psu, and the 30-day moving average salinity at TR is also at a seasonal 0.3 psu. The 365-day running sum of the cumulative flow from the five creeks feeding Florida Bay decreased slightly to 351,266 acre-feet (above the average of 257,628 acre feet). Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

- Water levels in WCA-3A and WCA-2A should be lowered. Closures initiated by FWC in the WCAs are still in effect due to high water levels and expectation of continued high water.
- The depth at gauge 65 (southern WCA-3A) has decreased slightly this week to 2.82 feet and has been above 2.5 feet for a fifth consecutive week. We recommend that water depths in southern WCA-3A should be reduced and remain below 2.5 feet throughout the wet season to protect tree island forests that were inundated for over 20 weeks in the dry season.
- Ascension rates need to remain under 0.25 feet per week to protect habitat and wildlife, including apple snails, prey of the endangered snail kite.

Recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

Everglades Ecological Recommendations, Oct. 4th, 2016 (red is new)

Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stages rose 0.00' to 0.11'	Rainfall, ET, management	Limit ascension rates to a maximum of 0.25 ft/week.	Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
WCA-2A	Stages rose 0.09'	Rainfall, ET, management	Maintain ascension rates <0.25 ft/week. FWC has initiated closures to protect wildlife due to high water levels.	Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails, prey for endangered snail kites.
WCA-2B	Stages rose 0.03'	Rainfall, ET, management	Limit ascension rates to extent possible with a maximum of 0.25 ft/week.	Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
WCA-3A NE	Stage fell -0.04'	Rainfall, ET, management	Reduce stages in northern WCA-3A. FWC has initiated closures to protect wildlife due to high water levels. Ascension rates should be limited to the extent possible of <0.25 ft/week.	Closures may eliminate deer hunting and possibly hunting of other species. They will also eliminate access to tree islands in WCAs -3A and 2A. Ascension rates not exceeding 0.25'/week will protect habitat and wildlife including reproducing apple snails.
WCA-3A NW	Stage fell -0.05'	Rainfall, ET, management		
Central WCA-3A S	Stage fell -0.01'	Rainfall, ET, management	Lower water depth at gauge 65. Slow the ascension rates to the extent possible with a maximum of 0.25 ft/week. When flows are changed a gradual reduction is recommended (stepping down over several days). FWC has initiated closures to protect wildlife due to high water levels.	Water depths at gauge 65 should remain below 2.5 feet over this upcoming wet season. Keeping depths below 2.5' at gauge 65 is important to allow tree island vegetation to recover from stress of the recent extended inundation duration. Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
Southern WCA-3A S	Stage fell -0.02'	Rainfall, ET, management		
WCA-3B	Stages rose 0.07' to 0.13'	Rainfall, ET, management	Limit ascension rates to extent possible with a maximum of 0.25 ft/week.	Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
ENP-SRS	Stage rose 0.12'	ET, rainfall, topography, management	Make discharges to the Park according to the ERTF rainfall plan.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities.
ENP-CSSS habitats	S-12A and S-12B have been opened.	Rainfall, ET, management	Follow rainfall plan for releases. Gradual reduction in flows through S333, and the S-12 structures when they decrease is recommended (stepping down over several days). Follow guidance in C-111 western spreader canal project operations manual.	Sparrows have ceased breeding for 2016. Future operations need to continue to provide appropriate hydrological and habitat conditions for breeding in subpopulation A.
Taylor Slough	Average to 6 inches above average	Rain, ET, inflows	Move water southward as needed	Provide freshwater buffer for ecosystems and maintain low salinity conditions downstream
FB- Salinity	0 to 8 psu above average	Rain, ET, inflows, wind	Move water southward as needed	Maintain lower salinity levels.